MONTHLY

JOURNAL OF AGRICULTURE.

VOL. I. APRIL, 1846. NO. 10.

GUANO:

ITS NATURE AND USE.

BY PROFESSOR HARDY, OF VA.

[☞ The following article, from the pen of Professor HARDY, we deem of sufficient importance to occupy the first place in the Agricultural Journal for the present month. The nature and qualities of different kinds of Manures are attracting the attention of intelligent farmers at the present time, to an extent quite unknown in the previous agricultural history of our country. Especially is this remark true of Guano—the peculiar properties of which, together with the experiments which have been made and the results ascertained by its use in the United States and elsewhere, are so ably and lucidly set forth by Mr. HARDY in the following pages:]

To J. S. SKINNER, Esq.—

Sir: The attention of our agricultural community has been specially directed, within a year or two past, to the use of Guano as a manure, but no decisive results, it seems, have yet been obtained in this country. It may, perhaps, be useful now, before another crop is planted, to review the subject and ascertain, if possible, what has been done and what may be expected. I design, at the present time, to bring together, in as short space as possible, the most important facts known respecting this substance, and to add any suggestions which may be presented.

In 1806, Bonplace and Humboldt delivered to MM. Vanquelin and Fourcroy a specimen of Peruvian Guano for analysis. They found that it contained 25 per cent. of uric acid combined with ammonia and potassa; also oxalate of ammonia, sal ammoniac, oxalate of potassa, phosphates of potassa and lime, chloride of potassium, fatty matter and sand. Since these results were published, several analyses have been attempted; and we shall place before the reader, in the following tables, such accounts as we have in hand. We place first the analyses of Völkel, Klaproth and Bartels.

Substances.	VÖLKEL.	KLAPROTH.	BARTELS.
Urate of ammonia	9·0	16·0	3·244
Oxalate of ammonia	10·6		13·351
Oxalate of lime	7·0	12·75	16·360
Phosphate of ammonia	6·0		6·250
Phosphate of ammonia and lime	2·6		4·196
Sulphate of potassa	5·5		4·227
Sulphate of soda	3·8		1·119
Phosphate of soda			5·291
Hydrochlorate of am'onia,	4·2		6·500
Phosphate of lime	14·3	10·00	9·940
Clay and sand	4·7	32·00	5·800
Common salt		0·05	0·100
Cereal matter (wax)			0·600
Alumina			0·104
Loss, including ammonia, organic matter, and water	32·3	28·75	22·918
Total	100·00	99·55	100·000

Mr. Hennell, of Apothecaries' Hall, England, has analyzed Guano, and his results are given

in the table below. Dr. Fownes has analyzed two samples—one "of a light brown color and extremely offensive smell," the other "deeper in color and without smell."

Substances.	Hennell.	Dr. Fownes. No. 1.	No. 2.
Phosphate of lime	30·5		
Phosphate of lime and magnesia		29·2	41·2
Oxalate of ammonia, uric acid, carbonate of ammonia, organic matter, and water	66·5	66·2	44·6
Alkaline phosphates, chlorides, and sulphates	3·0	4·6	14·2
Total	100·0	100·0	100·0

Prof. Johnston took two specimens of Guano from the same box, and found in one 8 per cent. of sand, and in the other 1 1-5 per cent. The other constituents are given in the following table:

Substances. Johnston—No. 1.	
Water, salts of ammonia, and organic matter, expelled by a red heat	23·5
Sulphate of soda	1·8
Common salt, with a little phosphate of soda	30·3
Phosphate of lime, with a little phosphate of magnesia and carbonate of lime	44·4
Total	100·0
Substances. No. 2.	
Water, and carbonic and oxalic acids, &c. expelled by a red heat	51·5
Ammonia	7·0
Uric acid	0·8
Common salt, with a little phosphate and sulphate of soda	11·4
Phosphate of lime, with a little phosphate of magnesia and carbonate of lime	29·3
Total	100·0

The preceding tables give the composition of South American Guano; the African has been analyzed by the joint labors of Dr. Ure and the Messrs. Francis and Philips. Their analyses of three specimens are found in the next table:

Substances.	No. 1.	No. 2.	No. 3.
Water	27·13	28·5	26·0
Ammonia	9·7		7·2
Ammoniacal salts, organic matter, and uric acid	32·96	46·5	38·8
Alkaline salts, chiefly potassa, with sulphuric acid, phosphoric acid, and hydrochloric acid	7·08	6·0	4·2
Phosphates of lime, magnesia, &c.	22·32	18·5	19·8
Sand	0·81	0·5	4·0
Total	100·00	100·0	100·0

Dr. Ure has also published the average of several analyses performed by himself.

Dr. Ure's Average.*

Organic matter, containing nitrogen, and capable of affording from 8 to 17 per cent. of ammonia by slow decomposition in the soil	50·0
Water	11·0
Phosphate of lime	25·0
Ammonia, phosphate of magnesia, phosphate of ammonia, and oxalate of ammonia, containing from 4 to 9 per cent. of ammonia	13·0
Silicious matter from the crops of the birds	1·0
Total	100·0

* For these tables I am indebted to the various works of Liebig, Boussingault, Petzholdt, Johnston, Thaër, and to the Farmers' Library.

During the summer of 1845, I received a specimen of Guano from Dr. Tignal Jones, of this county: it was obtained by the Agricultural Club, of which he is a member, from Messrs. McIlvaine and Brownley, Petersburg, Va., and warranted to be the genuine South American. The following results have been obtained from its examination:

Water at the temperature of 115° F. dissolves 66·5 per cent.

Hydrochloric acid dissolves 90 per cent.

From 100 grains, by the use of lime and hydrochloric acid, I get 25 grains of sal ammoniac.

According to Petzholdt, 68 per cent. of the genuine Guano is soluble in lukewarm water, 94 per cent. in hydrochloric acid, and 100 grains give 27 of sal ammoniac. By comparing these numbers with those I have obtained, any one can form an opinion as to the genuineness of the article. Considering the variable composition of Guano, I should conclude that the specimen I have received is genuine, though the preceding results would seem to justify some doubt.

As I have attempted to examine this specimen with some accuracy, it may, perhaps, be interesting to some of my readers to know my results. In the succeeding table I give them for three different analyses:

Substances.	No. 1.	No. 2.	No. 3.
Ammonia	8·33	7·90	8·12
Water, and carbonic, oxalic and uric acids, &c. expelled by a red heat	56·50	55·30	58·00
Common salt, phosphoric and sulphuric acids, with soda, &c.	9·27	10·12	9·00
Phosphate of lime and magnesia	24·60	25·50	23·50
Sand (nearly uniform)	1·00	1·00	1·00
Loss	0·30	0·18	0·38
Total	100·00	100·00	100·00

The specimen I examined was of a light brown color, earthy appearance and offensive smell, with small white portions intermingling with the mass.

By a comparison of any of the preceding tables, we shall perceive that the composition of Guano is by no means uniform. Of the fifteen analyses given, no two are identical; and, indeed, the methods of research adopted by chemists, as well as the terms in which their results are stated, are so various that the composition of the manure appears to be less uniform than it is in fact. The results of Völkel, Klaproth and Bartels, who, more than any other chemists, have given the ultimate constituents, are similar, though far from being identical; and the same remark might also be made of Dr. Ure's average, Prof. Johnston's analyses, and my own (if I may compare mine with theirs). A similar approximation is found in the table containing the results of Mr. Hennell and Dr. Fownes.—But, notwithstanding these real approximations,

the conclusion, from the tables, is yet inevitable that the composition of Guano is exceedingly variable.

It must be observed, however, that, while its composition is not uniform, it contains large amounts of the earthy phosphates and the ammoniacal and alkaline salts, all of which are considered active manures. We may consider it an impure compound of the phosphates of lime and magnesia, and of the ammoniacal and alkaline salts.

Several attempts have been made to form artificial Guano—that is, to combine salts in such proportions that the mixture shall have the same properties and value as Guano. As the supply of natural Guano is thought to be limited, it is matter of importance to form an artificial compound of equal value, if, indeed, the substance be as valuable in Agriculture as some have represented. I shall add, therefore, at this place, the composition of one or two specimens of artificial Guano. The following is that recommended by Petzholdt:

Bone dust, or phosphate of lime	3 cwt.
Sulphate of ammonia	1 cwt.
Common salt	1 cwt.
Sulphate of soda	10 lbs.
Pearlash	10 lbs.
Total	520 lbs.

I give also the composition of Johnston's mixture, the basis of Turnbull's artificial Guano, mentioned in a succeeding table:

Bone dust, or phosphate of lime	315 lbs.*
Sulphate of ammonia	100 lbs.
Pearlash	5 lbs.
Common salt	100 lbs.
Dry sulphate of soda	11 lbs.
Total	531 lbs.

Johnston considers this amount fully equal in efficacy to 4 cwt. of Guano which cost more than twice as much.

Dr. Liebig has undertaken to reduce the same principle to practice on a large scale. His object is to form an artificial Guano or manure for every plant. Having determined its mineral constituents, and the ratio in which they enter the plant, he combines on this basis various salts, to form a manure suitable for the plant. The mineral constituents of Havana tobacco, for instance, may be stated as follows:

Salts of potassa and soda	24·30
" Magnesia and lime	67·40
Silica	8·30
Total	100·00

The principle is obvious and rational that these substances, combined in the ratio of the corresponding numbers, should form a sufficient manure for Havana tobacco. We may safely pronounce as to the correctness of the theory involved, and may we not hope that experience and skill will develop results of high interest to Agriculture? Perhaps the introduction of Guano, as a manure among us, may be of greater benefit to Agriculture, by suggesting new methods of forming artificial manures, than by any special use we can make of the natural substance.

I shall now proceed to notice, as briefly as possible, those facts which bear on the value of Guano in practical Agriculture.

Prof. Johnston says:—"Its real origin was known to the government of the Incas, and its national importance fully understood. It was made a capital offence to kill the young birds on the Guano Islands." It has been used in Peru for so long a period that "the memory of man runneth not to the contrary," contributing more to the happiness of the people and the security of Government than her richest mines. The small rocky islands, Chinche, Ilo, Iza and Arica, have for ages been the source of agricultural wealth to the neighboring nations. Humboldt stated more than twenty years ago that "fifty vessels were annually loaded at Chinche alone with the Guano, each trader carrying from one thousand five hundred to two thousand cubic feet." The Peruvian farmer uses it chiefly for Indian corn; and Mr. Bland, of Liverpool, who has resided on the coast of Peru many years, has stated—"In the valley of Chaucay, distant from Lima about forty miles, a soil which, *without* Guano, is capable of producing only 15 for 1 of Indian corn, *with* Guano is made to produce 300 for 1." It is not only employed for manure in the provinces which lie along the coast, but it is carried across the desert of Atacama many leagues inland, "on the backs of mules, over rough mountain paths, and at a great expense, for the use of the agricultural districts of Peru and Bolivia." Some have estimated that Peru alone purchases annually ten millions of pounds for her own use.

In the United States, and especially in Great Britain, many experiments have been made with the view of testing the value of Guano as a manure in those countries. All such experiments we shall not pretend to give, but we shall notice them at some length, both with the view of directing attention to them and with the hope that the Agriculturists of the United States may be excited to greater care in testing this and other manures.

Johnston in his admirable "Lectures on the Applications of Chemistry and Geology to Agriculture," has reported a large number of valuable results, obtained at the expense of much labor and skill. Every person who desires to be an intelligent farmer should have in his possession these "Lectures," from the press of Wiley

* 7 bushels—containing 35 lbs. Am.

& Putnam—a work containing, in our judgment, more agricultural science and information worthy of confidence than any other single work in the English language. The following tables embrace a small portion of what Johnston has reported respecting Guano:

TABLE I. *Comparative Experiments with various substances used as Manures for growing Irish Potatoes, planted 18th May and lifted 12th October, 1842. The quantity of land in each plot was one-sixteenth of an imperial acre.*

No.	Descriptions of Manures used, and kinds of Potatoes.	Quantity of manure per acre.	Produce in tons, &c. per acre.			Cost of manure per acre, in sterling money.		
			tons.	cwt.	qrs.	£	s.	d.
	A.—WHITE DON POTATO.							
1.	Turnbull's humus	30 bushels	11	8	2	2	7	0
	Wood ashes, mixed	30 bushels						
2.	Rape dust	1 ton	12	6	2	8	12	0
3.	Turnbull's prepared bones	3 cwt.	13	14	1	0	18	0
4.	Turnbull's artificial Guano	3 cwt.	10	15	0	1	4	0
5.	Natural Guano	3 cwt.	18	9	0	3	17	0
	B.—RED DON POTATO.							
6.	Soil, simple		6	15	0	....	.....	
7.	Wood ashes	50 bush.	7	10	2	1	5	0
8.	Natural Guano	4 cwt.	14	6	5	5	0	0
9.	Do. and wood ashes	4 cwt. 25 bush. ashes.	15	15	0	5	12	6
10.	Do. do. and wood charcoal	4 cwt. 20 bush. charcoal.	17	10	0	6	0	0
11.	Turnbull's artificial Guano	4 cwt.	12	15	0	1	12	0
12.	Do. and wood ashes	4 cwt. 25 bush. ashes.	12	15	0	2	4	6
13.	Turnbull's prepared bones, and wood ashes	4 cwt. 25 bush. ashes.	13	14	1	1	16	6
14.	Turnbull's prepared bones	4 cwt.	12	15	0	1	4	0
15.	Rape dust	1 ton.	10	0	0	8	12	0
16.	Do. and wood ashes	1 ton, 25 bush. ashes.	14	0	0	9	4	6
17.	Potash and quick-lime, (1 lb. potash to 1½ tons lime)	60 bush.	9	15	0	2	2	0
18.	Gypsum	5 cwt.	9	15	0	0	12	6
19	Salt and quick-lime, (4 cwt. salt to 1½ tons lime	60 bush.	8	10	0	1	0	0
20.	Bone dust	45 bush.	9	15	0	6	14	0
	C.—CONNAUGHT CUPS POTATO.							
21.	Soil, simple		5	15	0	.....	.....	
22.	Bone dust	45 bush.	9	15	0	6	14	0
23.	Natural Guano	4 cwt.	13	14	1	5	1	6
24.	Rape dust	1 ton	13	0	0	8	12	0

The above manures were put in with the potato cutting—no top-dressing being afterward applied.

TABLE II. *Comparative Effects of Guano, Farm-yard Manure, Gypsum, &c. by themselves, and in mixture upon Potatoes, of different varieties, planted 25th, 26th and 27th April—lifted, measured and weighed from 12th to 14th October, 1843—on one-eighth of an imperial acre.**

No.	Manures.	Quantity applied.			Cost of Manure.			Produce per acre.		Value of Potatoes at 40s. per ton.		Variety of Potato used.
		c. yds.	qrs.	lbs.	£	s.	d.	tons.	cwt.	£	s.	
1	Guano		1	14	0	3	9	19	5	38	10	Perths, Reds.
	Farm-yard manure	2½			0	12	6					
2	Guano		1	14	0	3	9	17	0	34	0	Rough Reds.
	Farm-yard manure	2½			0	12	6					
3	Farm-yard manure	5			1	5	0	14	15	29	10	Do.
4	Guano		1	14	0	3	9	16	0	32	0	Cups.
	Farm-yard manure	2½			0	12	6					
5	Guano		1	14	0	3	9	18	0	36	0	Do.
	Farm-yard manure	2½			0	12	6					
	Gypsum			14	0	0	2¼					
6	Farm-yard manure	5			1	5	0	15	5	30	10	Do.
	Gypsum (top-dr.)		1		0	0	2					
7	Farm-yard manure	5			1	5	0	14	0	28	0	Do.
8	Guano		1	14	0	3	9	16	5	32	10	Buffs.
	Farm-yard manure	2½			0	12	6					
9	Guano		2	14	0	6	3	15	0	30	0	Do.
10	Farm-yard manure	5			0	1	5	12	0	24	0	Berw'ks, Blues*
11	Guano		2	14	0	6	3	10	15	21	10	Do.

* For some information as to the terms used in these tables, and in the "Lectures" by Prof. Johnston, see *Note* at the end of this communication.

TABLE III. *Comparative Effects of Guano and other Manures on Turnips, Potatoes, Wheat, Barley, Oats, Beans, and Hay.*

	Top-dressed with		Produce per acre. Tons.	Cwt.
SWEDISH TURNIPS,				
1.	Farm-yard manure	20 tons	18	11
	Guano	3 cwt.	23	8
2.	Farm-yard manure	20 tons	16	18
	Guano*	2½ cwt.	17	4
	Bones	32 bush.	15	17
YELLOW TURNIPS.				
	Guano†	5 cwt.	32	2
	Rape dust	15 cwt.	24	11
	Bone dust	30 bush.	17	2
POTATOES.‡				
1.	Guano	3 cwt.	18	9
	Rape dust	1 ton.	12	6
2.	Guano	4 cwt.	14	6
	Rape dust	1 ton.	10	0
	Bone dust	45 bush.	9	15
3.	Guano	4 cwt.	13	14
	Rape dust	1 ton.	13	0
	Bone dust	45 bush.	13	14
WHEAT.			Bush.	Lbs.
1.	Guano	1 cwt.	48	0
	Rape dust	16 cwt.	51	0
	Undressed		47½	0
2.	Guano	3 cwt.	30	40
	Undressed		24	56
3.	Guano	2 cwt.	32	20
	Undressed		31	31
4.	Guano	1 cwt.	46	15
	Nitrate of soda	1 cwt.	51	18
	Undressed		44	4
5.	Guano	1½ cwt.	45	0
	Nitrate of soda	1½ cwt.	41	0
	Undressed		39	0
BARLEY.				
	Guano	3 cwt.	64	0
	Undressed		47	15
OATS.				
1.	Guano	2 cwt.	70	0
	Undressed		52	0
2.	Guano	1 cwt.	48	16
	Nitrate of soda	1 cwt.	50	0
	Undressed		49	0
BEANS.				
	Guano	2 cwt.	33½	0
	Rape dust	16 cwt.	35	0
	Nitrate of soda	1 cwt.	33	0
	Undressed		29¾	0
HAY.			Tons.	Cwt.
1.	Guano	1½ cwt.	1	18
	Nitrate of soda	1½ cwt.	2	10
	Undressed		1	8
2.	Guano	1½ cwt.	2	2
	Nitrate of soda	1½ cwt.	1	17
	Undressed		1	10

The various localities where these results were obtained we omit to mention; we also leave our agricultural readers to make their own inferences from the tables.

Robert Monteith, Esq., and David Barclay, Esq., M. P., have published the results of experiments, made by themselves, very favorable to the use of Guano. (Vide MONTHLY JOURNAL OF AGRICULTURE, pp. 134—364.)

What was declared as the opinion of a club of English farmers in 1845, seems to be the prevailing opinion in Great Britain, "that Guano is an important auxiliary to the resources of the farmer in obtaining luxuriant crops, and is the cheapest and most important substitute for farm-yard manure, being found, in some instances to produce as good crops at half the cost." (Vide MONTHLY JOURNAL OF AGRICULTURE, p. 241.)

In the preceding tables of Prof. Johnston, we observe some instances where Guano, applied as a top-dressing to wheat and oats, had no beneficial effect, and, in other cases, its benefit was very partial. The excessive drouth of 1842 is assigned as the cause of these failures, and it is also probable that Guano is not so apt to have a favorable influence, if applied as a top-dressing.

Omitting much that has been reported by English experimenters, we pass to what has been done in the United States. Very few, if any, accurate experiments has been made in this country within our knowledge, and the larger portion of what we shall use may be found in detail at page 29 of the MONTHLY JOURNAL OF AGRICULTURE.

Twenty years ago, Governor Lloyd, of Maryland, reported "that the effects of Guano as applied to Indian corn were remarkably favorable." Mr. Mackenzie has published in the Southern Planter that, after applying it in various ways to wheat, corn, and oats, "the money and labor he has expended on Guano have been entirely thrown away." Mr. Tatum, of the Farmers' Cabinet, gives an account of some trials on the farm of Mr. Richie, near New-York; one of which he thinks shows, at any rate, "that there is virtue in Guano." In this case it was applied to oats. Mr. Stabler, of Maryland, has reported very favorably of its effects on his wheat and oats, and concludes that his crop of 1845 will *twice overpay* him for the Guano used. In some experiments by Hon. Mr. Pearce, it was applied to grass, wheat, oats, clover and corn. With grass, wheat and clover, the effect was favorable; with oats and corn, unfavorable. "So far" he says, "I am much pleased with the Guano." Dr. Dupuy and T. P. Pleasants of Petersburg, Virginia, have published very encouraging accounts of its application to tobacco plants, cabbage plants, and other garden vegetables; also wheat, oats, and Irish Potatoes. They failed in some instances, on account of the drouth of last year. Mr. Pleasants says, "In fine, considering the character of the season, the results are in almost every way satisfactory." More recently, on page 413 of the Journal, he gives a still more favorable account of these experiments at Petersburg, and concludes, "I feel no hesitation in making another trial." Mr. Oddie,

* Mixed with 1 cwt. of charcoal powder.
† Mixed with 20 bush. wood ashes.
‡ The manure was here applied to the potato cuttings.

of Rockland, New York, steeps his seed in the liquid Guano, and finds it to be an admirable emetic for the crows—the best scare-crow extant,"—a rather odd application of *bird-dung*.

Mr. Teschemacher of Boston, a man both of scientific and practical knowledge, holds the following language on the subject: "I confess I am surprised to hear of so many failures—*all* which I have been able to investigate arise from error in application. In no soil but a stiff clay can it fail to produce its effects; in no soil but one amply provided already with phosphate of lime can its effects fail to be permanent." (Vide Mon. Jour. Agr., p. 150.)

I have received from gentlemen of this county some information as to their use of Guano. Capt. H. Lockett, having mixed it with ashes in the ratio of one measure to seven, applied the mixture to a portion of tobacco, at the same time applying wood-ashes to another portion. He observed no difference between the effects of the mixture and those of the ashes alone. In both instances the crop was more thriving than on the land not manured.

J. J. Williamson, Esq., used it for wheat and tobacco. For tobacco, not more than a teaspoonful to the hill; the crop was as good as that on much stronger land. Wheat, top-dressed, became green, but the crop was not thought to be larger.

Alexander Jones, Esq., used a mixture of 8 lbs. of Guano, to a half bushel of wood ashes and applied it to a *patch* of tobacco plants 10 by 16. It killed them outright. With wheat it was more tolerable.

These gentlemen agree in the opinion that the severe drouth of last year seriously interfered in their experiments with Guano.*

Such is the sum of our information on the use of this manure in Great Britain and this country. One or two obvious remarks present themselves.

1. It is doubtful according to the testimony presented above, whether Guano can be used profitably in the United States. Future experiments must determine the question.

2. Considering the beneficial effects of Guano in England and the conflicting accounts as to its use in this country during the unusually dry season of 1845., it should seem that agriculturists ought to be encouraged to give the manure a fair and full trial the present year. No manure untried before and elsewhere beneficial can be prudently discarded by the American farmer, because it was not able to contend successfuliy with the drouth of the past season.

3. Whatever other conclusion may be drawn from the results we have brought together, it is obvious that English farmers have attained to greater precision and skill than the American in conducting agricultural experiments. We shall, therefore, close this essay with a few suggestions respecting such experiments.

1. The object of the experiments should be *to test the comparative value of different manures as to specific crops*. Statements of a general indefinite nature are of little value. Precision is as important as correctness.

2d. The quantity of land manured in each case should be measured; the kind, cost and amount of each manure, and the time and manner of its application should be given; the crop, when mature, should be carefully gathered, weighed, or measured; and the relative cost of the manures per 100 lbs. or bushel should be precisely ascertained.

Tables 1 and 2 are well constructed and may be safely imitated by all who wish to obtain and publish accurate information. In all instances an equal portion of unmanured land should be cultivated.

3d. If scientific men could be employed, the land, the manures and the crops should be analyzed. While this cannot be expected in but few instances, it should be attempted wherever it is practicable; and the result must be highly creditable both to American science and American husbandry.

4th. Every agricultural club and association should have in view at all seasons of the year some well-defined specific objects to be accomplished. The subjects requiring the attention of the intelligent farmer are numerous and interesting; and no season should be permitted to arrive without bringing the results of some well-conducted skillful experiment.

If these plain and obviously correct rules had been observed the past year in the the experiments with Guano, instead of loose statements and indefinite opinions, American husbandry would have presented to the world a mass of well authenticated facts and precise agricultural statistics. May another year be crowned with a richer harvest of agricultural knowledge and more abundant stores of agricultural products.

J. W. HARDY.

Randolph, Macon College, Va., Feb. 15, 1846.

NOTE.—Imperial, Scotch and various other acres are referred to in agricultural works.

The English acre, as established by statute in the reign of Henry VIII, is the same with the American acre, and contains 4,840 square yards. With this we compare others.

English acre.....	4,840	square	yards.
Scotch, do.	6,150½	do.	do.
Irish, do.	7,841½	do.	do.
French, (arpent) acre..	6,050	do.	do.
Welch acre.....	9,680	do.	do.
Staffordshire acre.....	10,240	do.	do.

In other counties of England more than 15.000

* The Guano they used was of the same lot with that I received from Dr. Jones.

square acres are included in the acre, 28 feet being the perch or pole instead of 16½.

The varieties of potatoes in Great Britain and Ireland are very numerous. A native of the Emerald Isle has told me he was acquainted with 100 kinds, and Rees mentions more than sixty. The names given them are taken from some property, use or excellences, or from the place where they are grown. Thus, *Connaught Cups* take their name from that part of Ireland called *Connaught*, and from the use sometimes made of them by the peasantry. White and Red *Dons* are white and red *gentlemen*. Berwick Blues and Perth Reds are distinguished by their color and the Scottish towns, Perth, and Berwick.

The titles are sometimes ludicrous—fully expressing the value placed on this root by the lower classes. Thus they have English, Late White and Red Champions; Winter, Late, Red-nose and Pink-nose Kidneys; Irish Apples, Golden Tags, Ox Noble, Poor Man's Profit, Lady Queens, Lords,—and the *gentlemen* before-mentioned—the *Dons*, and the Drunken Landlord.

This root is said to be a native of Peru—the land of Guano, and was first carried to Europe by Sir Walter Raleigh, who on his return from Virginia in 1623, left the seed in Ireland. It may now be called the bread-root of Europe. With the manure from its native country more than 18 tons per imperial acre have been produced in England.

PROSPECTS IN VIRGINIA FOR NEW SETTLERS.

PROPOSED SETTLEMENT OF NEW-JERSEY FARMERS IN THE VICINITY OF PETERSBURG.

To the Editor of the Farmers' Library:

HICKSFORD, Greenville Co. Va. Feb. 12, 1846.

THIS place takes its name from the circumstance of its being a *"fording"* place on the *"Meherrin"* River, and is the seat of government of the county above named. The surrounding county is flat, and the growth of timber is pine and oak. I did not expect so soon to strike the *cotton* region, but that plant constitutes, here at the end of a day's railroad journey from Washington, one of the chief staples of the county; hence it is carried by railroad to the Factories at Petersburg, and the surplus thence to the North, where capital, greater industry and superior intelligence, assisted by the legislation of the country, are levying, and will forever levy contributions on sloth and ignorance. By superior intelligence I do not mean that there are not, in the slaveholding States, men, very many men, of bright and cultivated intellect, excelling in vivacity and force, men of the same relative standing toward the masses, to be found in the North—not at all! When I speak of the superior intelligence of the North, I refer to the *masses*, to the great body of voters, who *prevail at elections and control the legislation and shape the policy of the country!*

Suppose it were possible, by some magic power, to lift up this whole county, and place it in the midst of Pennsylvania, or New-York, or Connecticut, or Massachusetts! Imagination can scarcely conceive a greater transformation than it would undergo, in the course of a few years. The portraits of Hecate and of Hebe present no greater contrast than would the pictures of what it *is* and what it *would be*. The land is naturally good and easily tilled, with a railroad for transportation of produce at the rate of 5 cents a bushel for corn and eight for wheat, with great water power, which in New-England would give employment to many more people than now inhabit this county, all of whom would be *non-producing consumers of agricultural produce*.

Oak wood is cut and brought and delivered in the village for $1 50 per cord, and pine wood is delivered at the railroad dépôt for *seventy-five cents!* You may judge, therefore, of the cost of labor. The land around sells from $1 to $3 or $4 an acre. A gentleman residing here has lately offered 1500 acres within two miles of the railroad for $4 an acre, on one, two and three years' credit, with all necessary buildings, even an ice-house, and a great quantity of wood, and oak and ash timber. River low grounds, that with indifferent cultivation will yield from 40 to 50 bushels of Indian Corn, sells for $12 to $15. Surely it behooves those who are invested with power to rule over the destinies of this naturally glorious region of country, to renounce the miserable blighting spirit of *party*, and to strive with one heart, to discover and banish the moral incubus, whatever that may be, which sheds its withering blight over the face of this land. You would imagine that in a country where houses are going to ruin, where fields once arable and fertile are abandoned to wood, and the wild tenants of the woods coming back to reinhabit them, you would see every man at work, struggling night and day to resist the progress of dilapidation, as "a brave man struggling with the storms of fate;" but instead of that, it is a rare thing to see a white man laboring systematically at the plow through the whole country.

The taverns and country stores are filled with young men, apparently half educated, and altogether unused to personal labor—not brought up in a fondness for books, and with no means at hand to indulge it, apparently the genteel but impoverished descendants of opulent and honorable ancestors—men of high cultivation and chivalry, with whom these old States so abounded before and at the time of the Revolution.

A difference in estimating the *value of time* seems to constitute the great distinction between Northern and Southern men. Here time seems to press like a burden, and the question is, not how it shall be turned to account, and how much can be made out of it, by the most incessant and sagacious exercise of all our faculties, but how the burden shall be thrown off, or made to sit lighter? For that purpose recourse is had to small gatherings in stores and taverns, and to frivolous amusements. There they soon form the *habit* of smoking and of drinking without at first perceiving the destiny to which they lead, until at last they are caught like the *fly in the spider's web!* Then, alas! when too late, their fate is revealed—their doom is sealed, and there remains no possible means of escape. This is the result of defective education. Be it your duty, then, Mr. Editor, to inculcate upon every farmer's son that nothing is more honorable than *labor*, and nothing so precious as *time*. How much more honorable would it be, to a young man whose family has been reduced from affluence to poverty, to seize the handles of the plow by day, and devote some hours at night to increasing his *store of knowledge* than to be riding about the country, running away from himself and from listlessness! Talk of labor, either of the body or the mind, as degrading or dishonorable! Is it degrading to be able "to adorn the earth and to bring its productive power into action—to apply the material substances of the earth to reasonable use, convenience and ornament—to expand and improve the human mind—to cultivate and strengthen the moral power? No product of the vineyard, the field, or the sea, however aided by inventive art, will furnish a welcome repast to one who sits in listless idleness, on a downy cushion, from breakfast time till dinner. The day laborer who sits down to his coarse meal, has a pleasure to which the listless idler is a stranger."

Virginia can never be regenerated until *these principles are taught in the schools*. Education must have a practical direction. Farmers must force legislators to look less to party objects, and more to the bearing of the laws on the formation of the character and the development of the capacity of the rising generation, for practical purposes. Is it not self-evident that *no idle white population can prosper?* To induce white men to labor, you must cause labor to be esteemed honorable. *The public sentiment must so pronounce it*—that public sentiment is formed by education. "As the twig is bent, the tree's inclined." Moreover, though labor may be esteemed honorable, that is not all: to make it profitable, you must give it *intelligence*. True, the labor of the ox is profitable, but what would it avail if man were not at the handles of the plow? But how much depends on the man's *mind*, whether it be rude and boorish, or spiritual and cultivated? For an illustration of the difference, see the difference between the houses, the tools, implements of war, and the means of conveyance used and enjoyed by the savage and the civilized man. There is something of all this difference in the growth and efficiency observable between the people of different States. In Massachusetts, where the whole mass of the population is educated, and where *not* to labor usefully, and efficiently, and steadily, is deemed *dis*honorable, the land which here is worth $3 an acre, would be worth $100 an acre. Look at the progress of population, and of actual power in the Government as between Virginia and Pennsylvania! In Virginia, education and the circumstances under which they are reared, (which may truly be said to constitute one's education,) lead young men, naturally and without any fault of their own, to be ashamed of personal labor in the fields. In Pennsylvania, a young man who does not labor at something useful loses caste. Well, with these opposite moral systems, these two commonwealths start together in the great race of development and growth, say in 1790—Virginia with her broad territory, her fine climate, her water power, her mines, her numerous and long navigable rivers, her fine scholars, her brilliant orators, her ardent patriots, her gentlemen of truest chivalry, and ladies with their fine silk stockings and charms that would melt the heart of stoicism itself!—And where do we find these two States at the expiration of half a century? They *begin*—Virginia with a population of 748,308, and Pennsylvania with 434,373, and in 50 years they end with, Virginia 1,239,797 and Pennsylvania with 1,724,033—where will they be in half a century more, unless by some more enlightened system of legislation, Virginia should do something to bring her immense resources into play?

These resources are not unknown to the people of other States, but there is obviously something which resists the force of her natural attractions. What is it? *A sign, however, has arisen in the East: New-Jersey farmers*, and what is still better, *Quaker farmers*, are inquiring for lands in Virginia, in the neighborhood of Petersburg, a place which possesses great advantages in its water power and its vicinity to the Chesapeake. The Agricultural Society of Petersburg, animated by a few en-

lightened spirits, have taken the subject in hand. I send you their Report, which it may be well to preserve, as it may, in time to come, form an interesting starting point in the history of an agricultural settlement that could not fail, by the influence of its example, to produce the happiest effects on the agricultural interests of that neighborhood. Who, in fact, can tell the benign results to which these incipient measures may lead?

Let me close this hasty letter by a few lines from one who spoke in parables of wisdom:

"Remember that time is money. He that can earn ten shillings a day by his labor, and goes abroad, or sits idle one-half that day, though he spend but sixpence during that diversion or idleness, ought not to reckon *that* the only expense. He has really spent, or rather thrown away, five shillings besides."

It is but fair to add, that this village and vicinity enjoy the benefit of cultivated society. The presence of such as Dr. Scott, the President of the Senate of this State, O. A. Browne, Merritt, and others who live here and hereabout, would be sufficient to give it that claim and advantage. The owners of land do not sufficiently reflect how much the value of their property, as well as their own enjoyment and the welfare of their families depend on good schools and good society—in a word, on the *reputation of a neighborhood*—for it may have its reputation as well as an individual. If infested with thieves, or what is as bad, made up in good part, of men of licentious and dissipated habits, no matter what may be the fertility of the land or the advantages of markets, or of health, prudent men who are looking about for places to settle themselves or their sons, will eschew such neighborhoods. They may do for what are in the slave States called "quarters," to employ surplus force, but will never attract gentlemen who wish to secure enjoyment and happiness for their families. He remembers the proverb that "*A rotten apple injures its companions.*"

VIATOR.

REPORT IN RELATION TO THE PROBABLE IMMIGRATION INTO LOWER VIRGINIA.

The Committee to which was referred the Resolution of the Petersburg Agricultural Society, adopted on the 27th of December last, in relation to the probable immigration into Lower Virginia of a number of farmers from New-Jersey, offer the following Report:

That they have regarded the subject as well worthy the attention, not only of this Society, but of Lower Virginia at large, whose prosperity could not fail to be promoted by the settlement of industrious Northern farmers within its limits. From the knowledge possessed by the Committee, of the tide-water portion of the State, they believe it to be unsurpassed in natural advantages. The climate is mild and genial, and generally salubrious; the soil is easy of culture, for the most part of good quality and susceptible of rapid improvement, and in many places even of extraordinary fertility, with the means of its restoration, when exhausted, nearly always at hand; the surface of the country is penetrated by a number of large, navigable streams; and the best markets in the Union are accessible with but little inconvenience; the various agricultural products of the Middle States are capable of being grown to the greatest advantage, and all the fruits of our country attain the highest perfection. Throughout this portion of the State, good lands may be bought at the cheapest rates, according to their situation—say from three to ten or fifteen dollars per acre—much less than the prices of lands above tide water, especially in the counties lying along the base of the Blue Ridge, and at a still greater disproportion to the prices of lands farther north.

Your Committee would be rejoiced to be able to offer sufficient inducements in our own immediate section of the State—that is to say, in the counties contiguous to Petersburg—to the consideration of those farmers of New-Jersey who propose to emigrate to Virginia. The Committee have made a number of inquiries, and have heard of many farms, and in some instances of large bodies of lands in Chesterfield, Prince George, Charles City, &c. which would be disposed of by the proprietors on reasonable terms. Some of these lands possess distinguished advantages. The price varies, of course, according to the locality and the state of improvement to which they have been brought; but inconsiderable in every instance, your Committee believe, when compared to their intrinsic value, and to the prices of lands in New-Jersey and Pennsylvania. The Committee have received a particular description of that part of Prince George bordering on the Appomattox River, between Petersburg and City Point, in which its advantages are believed to be by no means overrated. The City Point Railroad on the south side of the river, and the railroad from Port Walthall to Richmond on the opposite side—to say nothing of the river itself—afford facilities for the transportation of all marketable produce almost from the farmers' doors. Your Committee, however, have not deemed it necessary to submit any minute descriptions of the several localities which have been brought to their notice, and conclude by recommending to the meeting the adoption of the following Resolution:

Resolved, That the Agent of the New-Jersey farmers be respectfully invited to call at Petersburg on his visit to Virginia, and that the members of this Society be requested, individually, to offer him the attentions due to a brother farmer, and to render him such aid as may enable him in the best manner to accomplish the object of his mission.

Petersburg, Feb. 6, 1846.

TO MIX PAINTS.—In mixing paints, *observe* that for *out-door work* you must use, principally or wholly, boiled oil, unless it be for the decorative parts of houses, &c.; then mix as for in-door work. For *in-door work* use linseed oil, turpentine, and a little "*driers*," observing that the less oil, the less will be the gloss, and that for "*flatted white*," &c., the color, being ground in oil, will scarcely require any farther addition of that article, as the object is to have it dull. The best "*driers*" are ground litharge and sugar of lead—the former for dark and middle tints, and the latter for light ones.

THE BREAD-FRUIT TREE.

THE earliest account of the Bread-Fruit is by Captain Dampier, in 1688. "The Bread-Fruit," says this navigator, "grows on a large tree, as big and high as our largest apple-trees; it hath a spreading head, full of branches and dark leaves. The fruit grows on the boughs like apples; it is as big as a penny loaf when wheat is at five shillings the bushel; it is of a round shape, and hath a thick, tough rind. When the fruit is ripe it is yellow and soft, and the taste is sweet and pleasant. The natives of Guam use it for bread. They gather it when full-grown, while it is green and hard; then they bake it in an oven which scorcheth the rind, and maketh it black; but they scrape off the outside black crust, and there remains a tender thin crust; and the inside is soft, tender and white, like the crumb of a penny loaf. There is *neither seed nor stone* in the inside, but all of a pure substance, like bread. It must be eaten new, for if it be kept above twenty-four hours, it grows harsh and choky, but it is very pleasant before it is too stale. This fruit lasts in season *eight months* in the year, during which the natives eat no other sort of bread kind. I did never see of this fruit anywhere but here. The natives told us that there is plenty of this fruit growing on the rest of the Ladrone Islands; and I did never hear of it anywhere else."

The scientific men who accompanied Captain Cook in his voyages, came home with the most enthusiastic ideas of the Bread-Fruit. Dr. So-

[Bread-Fruit Tree.]

lander calls it "the most useful vegetable in the world," and urges that no expense should be spared in its cultivation. The mere idea of bread, the most valuable food of man, growing spontaneously, was doubtless calculated to excite attention—almost, perhaps, as strongly as the subsequent description of the poet:

The Bread-Tree, which, without the plowshare, yields
The unreaped harvest of unfurrowed fields,
And bakes its unadulterated loaves
Without a furnace in unpurchased groves,
And flings off famine from its fertile breast,
A priceless market for the gathering guest. *Byron.*

But, after all, the Bread-Fruit Tree has not, hitherto at least, answered the expectations that were entertained. The Banana is more easily and cheaply cultivated, comes into bearing much sooner after being planted, bears more abundantly, and is better relished by the negroes. The mode of propagating the Bread-Fruit is not, indeed, difficult; for the planter has only to lay bare one of the roots, and mound it

with a spade, and in a short space a shoot comes up which is soon fit for removal.

Europeans are much fonder of the Bread-Fruit than negroes. They consider it as a sort of dainty, and use it either as bread or in puddings. When roasted in the oven, the taste of it resembles that of a potato, but it is not so mealy as a good one. [Penny Magazine.

[Bread-Fruit, Flower and Leaf.]

SUGAR, AND ITS EFFECTS ON MAN AND ANIMALS.

BY JAMES H. FENNELL,

Author of "A Natural History of Quadrupeds," &c.

SUGAR is one of the most ancient productions of India. Its European names, sugar, sucre, &c. are evidently derived from the Sanscrit *sukkhar*, and sugar-candy from *sukkhar-kund*. The cane is most extensively cultivated in the West Indies; and it was not until lately that it was introduced into the East Indies, but it has spread rapidly there, and the climate all over India seems perfectly adapted to it. The canes of the West Indies may be said to be almost wild and primitive, but those of the East Indies are really cultivated, and the great superiority of their Sugar affords an excellent proof of the importance of culture. When the cane had been introduced into Bourbon and Otaheite, the same superiority of the quality and quantity of the crops in comparison with those of the West Indies, on similar extents of ground, or from a like number of canes, was remarkable. Attention being called to this fact, the West India proprietors actually obtained the cultivated canes of Bourbon and Otaheite, and planted them to very great advantage about the close of the last century. In Affghanistan the cane thrives well, and yields an excellent Sugar, but the people are ignorant of the mode of crystalizing it, and therefore they are indebted to Hindostan for their large supplies of sugar-candy. The Affghans cut the fresh cane into small pieces, which they eat as sweetmeats. The cultivation of the cane has lately been introduced into the island of Singapore, and promises to become one of its most important branches of commerce.—Some French capitalists have purchased land at Algiers, on which they are growing it. In Sicily, Spain, and Italy, it was formerly cultivated, but, we believe, its culture is now abandoned in those countries.

Saccharine juice abounds in all the maples; and, in North America, where there are large forests of these trees, a very good sort of Sugar is extensively made from two species, though the black sugar maple is by far the least productive of the two. Pursh tells us that the Americans "obtain the juice by tapping the trees in spring; warm days and frosty nights are most favorable to the plentiful discharge of the sap. A hole is made in the tree in an ascending direction, with an auger, and a spout made of elder is introduced about half an inch, which projects from three to twelve inches. The sap will sometimes flow six weeks, accord-

ing to the temperature of the weather. Troughs are placed under the spouts to receive the sap, which is carried every day to a large receiver, from which it is conveyed, after being strained, to the boiler. Lime, eggs, or new milk are added to the sap, in order to clarify it; but clear Sugar may be made without any of these ingredients. The Sugar, after being sufficiently boiled, is grained, clayed, and refined, in the same manner as the sugar-cane in the West Indies.—The sooner the sap is boiled the better. It should never be kept more than twenty-four hours. The quality of maple sugar is superior to that which is made in the West Indies from the cane, and it deposits less sediment when dissolved in water. It has more the appearance of sugar-candy. The maple-sugar is, in fact, equal to any other Sugar, and is procured with little trouble." In the north of Europe, Sugar has been obtained from other species.

The traveler, Spencer, has given us an account of the Sugar which the Circassians procure from the walnut-trees that flourish in extraordinary perfection on the Caucasian mountains. During spring, just as the sap is rising, they pierce the trunk of the tree, and leave a spigot in it for some time. When the spigot is withdrawn, a clear, sweet liquor exudes, which they allow to coagulate, and sometimes they refine it. They sometimes use, as a substitute for Sugar, clarified honey, that has been perfectly bleached in the sun.

In France, the manufacture of Sugar from chestnuts is going on very promisingly. Some of the proceeds give fourteen per cent. which is above the mean proportion extracted from beet-root.

Professor J. F. W. Johnston says that the saccharine exudation that drops from the *Eucolyptus* of Van Diemen's Land is not a sort of manna as it was supposed to be, but a peculiar kind of sugar, which may be collected in considerable quantity. When crystalized from alcohol, it gave the same composition as grape sugar, but differs from it in relation to heat and other proper ties. The honey-dew, which exudes from limes and other trees, is of a saccharine nature, and Curtis says that if it could be procured in sufficient quantities it would serve well for Sugar. The Abbe Boissier de Sauvages has, indeed, described "a shower of honey-dew," which fell from a lime-tree in the King's garden at Paris. A correspondent of the *Gardener's Gazette* states that he had some bee-hives near a large wood of oak, where there was a honey-dew visible for thirteen successive mornings in August, and that each of these hives produced considerably more honey than those which were farther off.

Sugar has been obtained from the leaves of the ash tree, and from the stems of the birch tree, and of some species of plants.

The American cultivators of maize, or Indian corn, find that by bruising the stalks of this plant while immature, they can express an excellent Sugar. Mr. H. Colman tells us that they have already ascertained that more than 1,000 lbs. weight of sugar can be obtained from a single acre, and he has no doubt that double that amount would eventually be procured by proper cultivation and management, the manufacture being yet in its infancy.

It is well known that Sugar is yielded largely by the roots of carrots and beet. In Russia, there are upward of thirty beet-root Sugar factories in full operation. This manufacture is also thriving in Germany. A few years ago, Messrs. Fies and Slaneward, of Quedlinburg, Westphalia, discovered a process whereby, in twelve hours, ten pounds of pure Sugar, perfectly crystalized, may be extracted from 100 lbs. weight of beet-root. The secret was immediately purchased by M. Brokhoff, of Wisburg, for 20,000 francs, on condition that it should not be used beyond the Rhine and Westphalia. A beet-root sugar manufactory has been established in Essex; and, in 1837, some refined samples of English beet-root Sugar, of good quality and color, were sold in the London market at £5 per cwt. Mr. Rootsey states that forty tons of mangel-wurzel, raised upon a single acre, yielded three tons and a half of molasses.

Sugar extracted from pumpkins is equal in every respect to that from beet-root. Potatoes, wheat, barley, beans and peas, have also been made to contribute to the "sweets of life," and have been found to yield the greatest quantity while immature. A species of *Lamaria*, containing a considerable quantity of Sugar, is highly esteemed by the Japanese, as an article of diet, after it has been washed in cold water, and then boiled in milk.

Near the base, and on the upper surface of the ovary, in the flower of the *Rhododendron ponticum* there is a minute glandular spot, whence exudes a thick, clammy juice, which, on desiccation, crystalizes into pure white and transparent sugar-candy, and the crystals, thus naturally formed in the flowers, are sometimes found to be as much as three lines in length, especially in morbid specimens that have withered without fully expanding their petals. It is remarkable that Sugar is yielded in the greatest quantity by plants previous to their attaining perfection, or after they have had their flowers plucked off, or have had their assimilating powers affected by disease or injury. Even in the human being, suffering under certain morbid states, Sugar is found to be secreted by the system. In the *Medico-Chirurgical Transactions*, second series, vol. viii. Dr. Bence Jones has written on Sugar discoverable in the blood of persons laboring under the disease of diabetes, and it is well known to be pretty largely contained in their urine.

In all parts of the globe, mankind evince a fondness for Sugar, which, in many cases, proves wholesome to the constitution. Mr. Montgomery Martin observes that—

> A small quantity of Sugar will sustain life, and enable the animal frame to undergo corporeal and (as I can add from personal experience) mental fatigue better than any other substance. Often have I traveled with the Arab over the burning desert, or with the wild Afric through his romantic country, and, when wearied with fatigue and a noontide sun, we have set ourselves down beneath an umbrageous canopy, and I have shared with my companion his traveling provender—a few small balls of Sugar mixed with spices, and hardened into a paste with flour. Invariably have I found two or three of these balls and a draught of water the best possible restorative, and even a stimulus to renewed exertion. During crop-time in the West Indies, the negroes, although then hard worked, become fat, healthy and cheerful. In Cochin-China, the body-guard of the King are allowed a sum of money daily with which they must buy sugar-canes, and eat a certain quantity thereof, in order to preserve their good looks and *embonpoint*. There are about 500 of these house-

hold troops, and their handsome appearance does honor to their food and to their royal master. Indeed, in Cochin-China, rice and Sugar is the ordinary breakfast of people of all ages and stations; and they not only preserve all their fruits in Sugar, but even the greater part of their leguminous vegetables, gourds, cucumbers, radishes, artichokes, the grain of the lotus, and the thick fleshy leaves of the aloes. I have eaten in India, after a six months' voyage, mutton killed in Leadenhall Market, preserved in a cask of Sugar, and as fresh as the day it was placed in the shambles. In the curing of meat, a portion of Sugar is often mixed with the salt and saltpetre. The Kandyans of Ceylon preserve their venison in earthen pots of honey, and after being thus kept for two or three years its flavor would delight Epicurus himself. In tropical climates, the fresh juice of the cane is the most efficient remedy for various diseases, while its healing virtues are felt when applied to ulcers and sores. Sir John Pringle says the plague was never known to visit any country where Sugar composes a material part of the diet of the inhabitants. Drs. Rush, Cullen, and other eminent physicians, are of opinion that the frequency of malignant fevers of all kinds is lessened by the use of Sugar; in disorders of the breast it forms an excellent demulcent, as also in weakness and acrid defluxions in other parts of the body. Dr. Franklin found great relief from the sickening pain of the stone by drinking half a pint of syrup of coarse brown Sugar before bedtime, which he declared gave as much, if not more relief, than a dose of opium. That dreadful malady, once so prevalent on shipboard, scurvy, has been completely and instantaneously stopped by putting the afflicted on a sugar diet. The diseases arising from worms, to which children are subject, are prevented by the use of Sugar, the love of which seems implanted by Nature in them. As to the unfounded assertion of its injuring the teeth, let those who believe it visit the sugar plantations and look at the negroes and their children, whose teeth are daily employed in the mastication of Sugar, and they will be convinced of the absurdity of the statement.*

Dr. Willis imputed a corrosive quality to Sugar; but in disproof of this notion, Dr. Slare has related, in the *Philosophical Transactions*, No. 337, that his grandfather had, all his lifetime, been in the habit of eating, at his breakfast, a great quantity of Sugar spread upon his bread and butter, and that he used also to put Sugar into his ale and beer, and even into the sauce he ate with his meat. When eighty years of age, he had all his teeth strong and firm, able to crunch the hardest crust, and free from all pain or soreness in his gums. In his eighty-second year one of his teeth dropped out, and, soon after, he lost another, which was one of the front teeth: in fact, all his teeth dropped out in two or three years; but, what is most remarkable, they were replaced by the growth of a perfectly new set. His hair was at that time of a very white color, but it now became much darker. He enjoyed good health and strength, and died in the ninety-ninth year of his age.

The French people are great eaters of Sugar, always carrying some of it about with them in their pockets and reticules, and generally putting five or six large lumps into each cup of coffee.

M. Chossat reports that Sugar, when used as the *exclusive* or *principal* article of diet, produces quite opposite effects in some persons, according to the differences in their system; for, while it fattens some, it creates bile which induces a diarrhœa and a wasting of the solids in other persons. The celebrated Bolivar had, by fatigue and privations, so injured the tone of his stomach, that he was unable at times to take any other food than Sugar, which, in his case, was easy of digestion. His personal friends assure us that in some of his last campaigns he lived for weeks together upon sugar alone as a solid, with pure water as a liquid; but, probably, in nine hundred and ninety-nine cases out of a thousand, this diet would soon have brought the person adopting it to his grave; for, on those whose digestion is feeble, a large or exclusive allowance of Sugar adds to their grievance, because the excess of nutriment, not being generally absorbed by their weakened system, becomes converted to bile, and causes great debility and wasting of the body. In seventeen experiments made on dogs, M. Chossat observed that, when the sugar diet fattened them, there was a general tendency to constipation meanwhile; and, on the contrary, when it produces an excess of bile in other dogs, their bowels were relaxed. Why English children suffer in their digestion after eating largely of sugar-plums, comfits, &c. is chiefly owing, however, to those delicacies being composed of the refuse of starch-works, mixed with plaster of Paris, pipe-clay, or chalk, and having, indeed, as little Sugar as will suffice to give them a palatable sweetness, and they are often colored with gamboge, and sometimes with red lead, verdegris, and other mineral poisons.

Everywhere, the beasts of the field, the birds of the air, the reptiles, fish, and insects, are found to have a great liking for Sugar and honey. Mr. Martin says he has tamed the most savage and vicious horses with Sugar, and has seen the most ferocious animals domesticated by being partly fed upon it. The tamers of lions and tigers owe their power over them chiefly to a judicious use of Sugar and other sorts of sweets, and also of lavender-water, and various other perfumes, of which feline animals are remarkably fond. In the sugar season, in the West Indies, the horses, mules, and cattle soon acquire plumpness and strength by partaking of the leavings of the sugar-canes, after the manufacturer has done with them. In Cochin-China, the elephants, buffaloes, and horses are all fattened with Sugar. We learn from the "Memoirs of Dr. Edward Cartwright," (1843,) that that ingenious man used to fatten sheep on Sugar. To birds this diet proves so nourishing, that the suppliers of the European poultry-markets find that Sugar, along with hemp-seed and boiled wheat, will greatly fatten ruffs and reeves in the space of a fortnight.

[Jour. of Highland and Ag. Soc. of Scotland.

A PROFITABLE ANIMAL.—The celebrated heifer Myrtle, the property of the Duke of Devonshire, was purchased by His Grace at the Royal Agricultural Meeting at Derby, at which meeting she won the first prize of £10 as the best yearling short-horned heifer. The same animal also gained the first prize of £10 at the Yorkshire Agricultural Meeting, at Doncaster, in 1843, as the best yearling heifer; and the first prize of £15 at the Royal Agricultural Meeting at Southampton, in 1844, as the best two-year old heifer. This beautiful animal was never surpassed at any exhibition, and is now only three years and nine months old; she has produced two calves at separate births, for which, together with the dam, 300 guineas have been offered and refused.

[Midland Counties Herald.

* History of the British Colonies, vol. ii.

THE SCIENCE OF BOTANY AND HORTICULTURE;

HOW CULTIVATED IN OTHER COUNTRIES.

THE degree of proficiency in the science of Botany and Horticulture reached by gardeners in Europe, may be judged of by the following.

A Curator to the Botanic Garden at CAMBRIDGE, England, was to be appointed; there were many candidates, all highly recommended. The Trustees wisely determined not to appoint on the mere faith of testimonials, so easily procured in all countries, but to subject the candidates to the test of a rigid examination by Professor HENSLOW. The Professor submitted the following questions, and after the decision was made, he declared that *each* of the candidates justified the testimonials produced in his behalf.

How many are there, gardeners or not gardeners, in this country, this side of the "American Athens," who could answer them? Yet such knowledge might be acquired by *half an hour's* instruction daily, by every boy in our country schools, if conducted by *competent teachers*. But there is our great deficiency: every State ought to have an institution for the *preparation of instructors*. True, this would be expensive, but how expensive, compared with the *many hundred millions of dollars*, which agriculturists have contributed for the support of *military officers and professors?* With the latter, however, are associated the tantalizing ideas of *war* and *glory!* and for these, surely, a sensible, self-taxing people will forego all thoughts of improving the "dull pursuits of civil life," and all that contributes to the fruitfulness of the country and the quiet happiness of the people! *"Oh! we are a glorious nation!"* and landholders of all classes the most zealous, acute and alert in all that concerns their real, true interests!

1st. Write down as many species of the following genera as you may remember to be under culture in England, stating their country, character of the plants, whether trees, &c. description of culture, whether stove, &c. natural order:—Berberis, Nymphæa, Cleome, Althæa, Pistacia, Sempervivum, Lonicera, Eupatorium, Vaccinium, Asclepias, Ajuga, Vitex, Croton, Dorstenia, Neottia, Pancratium, Ruscus, Paspalum, Stipa.

2d. Name a few of the principal genera under culture, in the following orders:—Tiliaceæ, Rutaceæ, Apocyneæ, Scrophularineæ, Coniferæ, Irideæ, Cyperaceæ.

3d. How do you distinguish the following orders from each other:—Papaveraceæ from Nymphæaceæ, Capparideæ from Cruciferæ, Cyperaceæ from Gramineæ?

4th. Point out the difference in the structure of the fruit of the Mulberry, Raspberry, and Strawberry.

5th. Describe the seed-vessels and seeds of the French Bean, Acorn, and Maize.

6th. What are the principal causes of sterility in cultivated plants, and how would you seek to counteract them?

7th. What are the conditions essential to the germination of seeds, and what are the chemical changes effected in them during the process?

8th. Describe the functions of the leaf.

9th. Fill up the imperfect sketch of a design for the new garden, inserting the following particulars:—1st. The houses to range north and south in an open area, in the center of the elliptic herbaceous ground. 2d. Sheds and compost pits to the north between the entrance there, and the north approach to the houses. 3d. Curator's house. 4th. Separate beds for the Grasses, Ferns, and Peat-Plants, away from the herbaceous ground. 5th. Arboretum. 6th. Pond in the north-west angle. 7th. Suggestions respecting the form and arrangements in the houses. 8th. General remarks upon the arrangement of a botanic garden.

THE AMATEUR GARDENER.—There is no pursuit to which man is more evidently led by the hand of his Creator than the cultivation of the ground. Our necessities render the spade and the plow of the first importance to every community, and a high or a low state of Husbandry will always be the distinctive mark of a flourishing or a declining people. In an occupation whose principal capital is industry, and whose object is the supply of our natural wants, the greater number of human beings must always be engaged. With the variations of fashion, and the mutations of ages, other pursuits, once sedulously followed, may become obsolete; but imagination cannot conceive a state of things in which the benignant stores of mother Earth will not be sought after.

The cultivation of the ground, in all its departments, manifests the high honor which is attached to human wisdom and skill by the great Lawgiver of the universe. Nature, wild and untended, will produce luxuriantly the indigenous fruits of the soil, but demands forethought and labor from her dependents, before she yields to them her most valuable riches. By observation, man has improved upon the past, and better methods of cultivation are constantly discovered. Now, in this process of induction, or the Baconian method, as it is called in philosophy, the amateur gardener has employed efforts which have often been crowned with eminent success. Those who till hundreds of acres as the means of subsistance have seldom the courage to perform experiments on a large scale; but the owner of a small garden can do so with pleasure unmingled with the fear of loss. Agriculture has thus been indebted to the lovers of gardening for many discoveries, by which the wealth of nations has been increased, and every amateur, however limited be his domain, may hope to add to the mass of knowledge. If, by the application of manure in some novel manner, or by experiments in hybridizing or crossing, a vegetable may be made more productive, the application of this principle may result in a grand national benefit. I have a great respect

for working gardeners of all grades, for this reason, that they are the silent and modest precursors of those great changes by which the vegetable property of a country acquires an enhanced value. Whether, therefore, you are delighting in an exclusive garden adjoining a country residence, or looking proudly on the beauties of a suburban retreat I thus remind you of a very important argument to be employed in the defence of your pursuits.

But I turn with pleasure from the objects contemplated by the spade and the plow to flowers, those luxuries of Nature, given to reward man for his obedience to the law, "In the sweat of thy brow shalt thou eat thy bread." These emblems of purity and innocence are like the bright eyes which animated the knights of the tournament, calling forth their exertions and rewarding their conquests. The matchless charms of flowers force the attention of the most tasteless of mortals, and win the hearts of the susceptible and refined. A child once said that the stars were little holes pricked in the firmament to let Heaven's glory through; a truthful idea, though linked to a physical error. Apply the same mode of reasoning to flowers, and what can they be but emanations of the beauty and happiness which reside in the mind of an Infinite Being? Their utility is less manifest than their subserviency to the wants of our intellectual nature, since they appeal almost exclusively to what is refined and sentimental and poetic in our constitution. Seed is produced without the accompaniment of a splendid corolla, with its wondrous sanctuary of stamens and pistils, as in the case of all kinds of corn, so that utility is rather associated with that which is plain and unattractive. But the most glorious structures of the floral world belong to plants which, in reference to man's bodily wants, may be called useless. Trade would go on, and fortunes be made, if the world did not possess a Carnation, a Tulip, or a Rose; and yet they are here, winning our attention and riveting the emotions of our hearts. Why are they here? Doubtless to recall us from pursuits carried on in reference to our lower nature, and to lead us to that which is gentle and good. The amateur gardener is thus evidently a respectful observer of the will of Heaven, when he receives these gifts with thankfulness, and bestows on them a portion of his intellectual worship. To think lightly of Floriculture is almost to disparage the wisdom of our Maker, who calls the attention of the child and the man by enameling the earth with the rich colors and lovely forms of these universal favorites. This is a second and convincing argument which you may use in refuting detractors, and justifying yourself. You may not succeed with the former, for some men are destitute of the power of appreciating such reasonings as I have endeavored to unfold. But be contented if you are able to satisfy yourself that in loving your garden you are acting right. Hear what has been written of wild flowers, and be sure that such sentiments are still more appropriate to those who have had something to do in the production of the beauty they admire:

"Oh! chide not at the simple theme that wakes the minstrel's lay; [som by the way:
Earth were less bright without the flowers that blos-
He at whose word the universe her ancient might did yield, [the field.
Hath taught proud man a lesson from the Lilies of
I thank thee, God! for every boon thy hand in mercy showers, [flowers!"
And oh, not least among thy gifts, the beautiful wild

AMMONIA AND WATER IN GUANO.

A Simple Method for Determining the Free and Combined Ammonia and Water in Guano and other Manures.—The want of a simple, accurate, and at the same time expeditious method for determining the amount of Ammonia in Guano has, I think, been felt by most chemists who have been engaged in the analysis of that manure for commercial purposes, where time necessarily becomes a matter of importance; and as the following method, which I have introduced into the laboratory of Dr. G. Wilson, Edinburgh, where several analyses of Guano are daily in progress under my direction, seems to me to possess these advantages, I beg leave to place it before the notice of chemists who may be similarly circumstanced. The quantity of free Ammonia in the Guano is first determined, along with that of the Water, by the following process:—A common test-tube (about 5 inches long and ¼ wide) is taken, and in it a determinate quantity of the Guano under examination is placed; from 25 to 50 grs. will be found most convenient. To the test-tube is then joined, by means of a cork, a tube of the same diameter, but only about 4 inches long, having one of its ends contracted and drawn out, so as to pass through the cork and leave a small communicating aperture for the escape of gas from the test-tube.—A few fragments of asbestos are then placed in the contracted end of the tube, to prevent the aperture being choked up during the progress; and the tube is then filled with fragments of caustic potash, either alone or mixed with fragments of lime, which I prefer. To the top of this tube is then joined another tube of precisely similar construction, but being only about 3 inches long, and which, the asbestos being placed as before, is filled with coarsely-pounded sulphate, nitrate, or chloride of copper, previously well dried. A few fragments of asbestos are now placed on the top of each of these tubes, so as to prevent any of their contents falling out. The tubes are then weighed separately. The three tubes are then connected, and the test-tube which contains the Guano is placed in a water-bath until all moisture has been expelled.—The tubes are now disconnected, and again weighed, when the quantity of Ammonia contained in the Guano in a free state is directly determined by the increase of weight which it is found that the tube containing the copper salt has suffered, while the quantity of Water is shown by the increase of weight in the tube containing the potash and lime. The quantity of com-

bined ammonia has now to be ascertained, which is done by adding to the guano contained in the test-tube about an equal bulk of caustic lime in fine powder, and mixing well by agitation; then connecting the apparatus as before, and exposing the test-tube to a low red heat, all the ammonia is expelled and combines with the copper salt contained in the upper tube, and, as before, it is determined by direct weighing. It is very easy to judge when all the ammonia is expelled and when the operation should be concluded, as the ammonia, in combining with the copper salt, gives it, as it proceeds up the the tube, a magnificent blue color, which, when it does not extend any higher up the tube, indicates the conclusion of the operation. In the case of any other manure, where the ammonia has to be found, the operation is precisely similar to the example of guano which I have here taken. I have no doubt that with some modifications, the condensation of ammonia by a salt of copper would be found of use in organic analysis for the determination of the nitrogen; and in one or two cases where I have tried it, the results closely approximated to those obtained by calculation. [D. Forbes, Esq. in the Chem. Gaz.

GENERAL TREATMENT OF GREENHOUSE PLANTS.

The practice of removing Greenhouse Plants into a higher temperature during the period of their growth, so well explained by Mr. Wood in his various communications, cannot be too earnestly recommended. When it is considered that in all the countries where they naturally grow, the summers are intensely hot, with clear sunny days, and heavy dews at night, how much quicker the growth of the plants and ripening of the young wood must be than can possibly happen in our dull, cloudy climate, even with the aid of glass, the universal custom of turning Greenhouse Plants out of doors indiscriminately in the month of May, is doubtless one of the very worst modes of treatment that can possibly be adopted, especially when, as is often the case, they are placed in some shady situation; at this period many are just beginning to grow, others have made some progress, but few or none are within many weeks of terminating their growth and ripening their young shoots, and it is very uncertain whether any of them, under such circumstances, even in the most favorable seasons, will accomplish their growth, consequently when the time arrives for housing, it will be found that three-fourths of them are still in a growing state, and now, when the short, cold, cloudy days have set in, they will continue to grow for weeks, and even months after being brought into the Greenhouse.

This mode of treatment can only end in disappointment; at the time they ought to be loaded with flowers there may certainly be a few solitary blossoms, but anything like a full crop is entirely out of the question. It is remarkable that Camellias appear to be the only family of plants that are rightly treated in this respect; it does not seem to occur to many gardeners that all other hard-wooded Greenhouse Plants require exactly the same treatment as Camellias; but instead of so doing, at the very time the latter are carefully shut up in a higher temperature, to encourage the growth and ripening of the young shoots, as the means of ensuring a fine display of flowers, all, or nearly all, the others are turned out of doors to take their chance of a hot or a cold summer, as the case may be.

When Greenhouse Plants are housed for the winter, then is the time to judge whether they have been rightly treated. If such is the case, they will mostly have finished their growth; the young shoots will have changed from a green to a red or brown color, and of a hard, firm texture, and the flower buds of many swelling out prominently, ready to start into flower with the slightest excitement, rendering the forcing them into flower at any time when required an easy and simple matter. Not only Camellias, but Acacias, Boronias, Azaleas, Epacris, Corræas, and in fact almost every kind of Greenhouse hard-wooded Plant, should be at rest, and ready to start into flower when the proper period arrives. On reading the Reports of the London Horticultural Exhibitions we are often surprised at the large dimensions of many of the plants therein mentioned, especially when we read that many of them are only two or three years old! There cannot be a doubt that this is accomplished by placing them in a strong genial heat, at certain periods, and will serve to show what can be effected in a short time under proper management.

Although the treatment recommended above is applicable to all hard-wooded plants, there are some beautiful things that will not thrive at all unless they are annually placed in a higher temperature to make their growth, and for want of such treatment are rarely seen in good health. Crowea saligna is a striking instance of this neglect, as it is generally seen starving in Greenhouses all the year round; instead of which it should be removed to the plant or pine-stove in January, and allowed to remain till May or June, when it will grow like a willow, making shoots from 8 to 16 inches in length; and when removed to the Greenhouse it will continue to flower all through the summer, a perfect gem, with flowers twice the size we generally see it produce under the ordinary treatment it receives.

As early as the month of January attention should be directed to such plants as have done flowering and are beginning to grow; these should be removed to a higher temperature without delay, and if necessary, it is the best time to shift them into larger pots, and when the young shoots have grown two or three inches in length and taken off with a heel, they will strike root better than at any other time. By attending to the gradual removal of the plants all through the spring months, and when having completed their growth, gradually to harden them for a week or two, and when ready to be placed out of doors for the summer, they may then, with perfect safety, be placed in a shady situation, and remain out as long in the autumn as they may be safe from severe frost. In large establishments a house entirely devoted to this purpose would be very useful; where this is not the case vineries, pine-stoves, pits, &c. may all be made available, and without much inconvenience, for this purpose, and even a brick pit without artificial heat, if kept pretty close, would be very useful in forwarding the growth of palms. I have been induced to dwell at some length on the above subject, from a firm conviction that it is not so generally or extensively put in practice as it deserves to be.

Robt. Reid, Noble Thorp.

From the Charleston (S. C.) Mercury.

EFFECTS OF DROUTH ON INDIAN CORN, &c.

TO THE PLANTERS AND FARMERS OF SOUTH CAROLINA.

At the late meeting of the State Agricultural Society, the following Resolution was adopted, viz.:

"That the President be requested to communicate to the public, before the planting season, such information as he may possess, or which it may be in his power to collect, in relation to the means of modifying the effects of drouth on Indian Corn and other provisions."

It is necessary for me to premise, that what I shall say concerning the use of the plow is mainly derivative. From several causes, the planters of the Sea Islands are but slightly acquainted, in practice, with the value of that great agricultural implement. To give the experience of the highest authorities is, therefore, on my part, an imperative obligation. It is proper, also, I should in this place observe that, in consequence of assiduous endeavors to obtain facts from supposed reliable sources, in which I have signally failed, this communication, which would have been made at a much earlier period, has been delayed, but not too late, it is hoped, to be wholly unprofitable.

Satisfactorily to elucidate the matter of the Resolution, would involve a minute examination of many of the topics connected with the science of Husbandry. As I am certain, however, it was not designed or intended that my remarks should take so wide a scope, I shall only briefly advert to those principles and their operation upon which some of the most valuable results in Husbandry rest.

All the earths have a considerable attraction for the fluid which the atmosphere contains. The very best soils possess this power in the highest degree; hence it may with certainty be assumed, that the measure of their fertility depends chiefly on their capacity to absorb moisture. In determining their value, however, on that head, two other properties have to be noticed: the quantity of water which is essential to their saturation, and their power of retaining it. In all these respects, clay and sand occupy antagonistic relations. The former imbibes the aqueous vapors like a sponge and parts with them reluctantly; when dry, it constitutes a compact mass; from the closeness of its texture, the dissolvent action of the air is excluded, by which putrefaction is retarded. The latter is friable and a septic; from the solidity of its particles and their want of coherence, water filters easily. In the adoption of expedients by which to secure these earths a supply of moisture, different processes, in part only, it is advisable to pursue. From their predominance in this State, I shall direct my attention prominently to clayey or aluminous soils. What, then, are the means which reason and experience assure us are the best calculated to attain the end in view? I answer, deep plowing; thorough pulverization of the soil; abundance of manure; and the use of salt and retentive atmospherical absorbents.

1st. *Deep Plowing.*—The roots of plants should be allowed to extend themselves in every direction. The deeper they penetrate, and the wider their ramifications, the greater will be the absorption of nourishment. The average depth of good soils is about 6 inches. Every inch added increases its volume 8 per cent.; so that a soil where the vegetable layer is 12 inches thick, is worth half as much again as that in which it is only 6 inches.* It is consequently obvious that whatever, from this cause, may be its enhanced value, if not reached at some time in the progress of cultivation, the remainder is in effect a *caput mortuum*. By deep plowing the capacity of the whole soil is called forth. While it enables the earth, through the agency of air and water, to inhale atmospheric manure, by diminishing the force of the sun's rays it lessens materially its exhalations. Should the substratum, which perhaps in every instance contains the principles of fertility, be broken, still, as a general proposition, the most signal benefits, prospectively, if not immediately, may confidently be expected to enure from the operation. Deep plowing ensures the greatest product from the smallest given quantity of land. If by the use of one-half of the soil ten bushels of Corn per acre be obtained, it is reasonable to infer, all other circumstances being equal, that were the whole in tilth, twenty bushels would be harvested: indeed a much larger quantity ought to be the result, for the deeper the soil the greater will be the number of stalks, and the larger and more numerous the ears. "The maize," says Taylor, "is a little tree," and possessing roots correspondent to its size, penetrates a depth almost incredible—9 feet, it is known, have been reached. It follows that, where, from the vigor of the plant or the friability of the land, the roots meet with no obstruction, the consequences of drouth will be sensibly diminished, if not entirely prevented. It is believed that the rolling of the leaves of corn is attributable solely to the absence of moisture. This is an error. Scanty manuring or shallow tillage is as often the true cause.

To render deep plowing† effectual, it should take place in autumn. The expansive power of frost, and the mollifying influence of air and rain, and the action of these in breaking the continuity of fibrous matter, are strong reasons in favor of the practice. Whether it should be done once in two or three years only, which, I believe, is the opinion of the most successful farmers of Great Britain, or annually, as is common in parts of our country, certainly as yet an undetermined point.

2d. *Pulverization.*—The soil must not only be made easily accessible to the descent and spread of the roots, but there should be such a disin-

* Thaër's Principles of Agriculture.

† About 12 inches.

tegration of its parts, as to allow the free transmission of air. However rich in ingredients, these afford no nutriment to vegetation, until subjected to the combined action of heat, air, and moisture—the great agents of decomposition. Unless freely supplied with oxygen, the remains of animals and vegetables do not decay, but they undergo putrefaction.* "The frequent renewal of air by plowing and the preparation of the soil, change the putrefaction of the organic constituents into a pure process of oxydation; and from the moment at which all the organic matter existing in a soil enters into a state of oxydation or decay, its fertility is enhanced." In a well compounded soil, water is presented to the roots by capillary attraction. As this increases in proportion to the smallness of the particles of earth, the advantage of their complete pulverization is plain. It is equally true, that as food for plants must exist in solution, it is requisite to admit water to the roots by artificially reducing the compactness of the soil by tillage. From frequent working, therefore, the most favorable results may be anticipated; Indeed, it has been well observed, that a good stirring of the ground in dry weather is equal to a shower of rain; for however strange it may seem, while it promotes moisture, desiccation is prevented. To aid in the increase and prevention of atmospheric vapor, the rigid system is especially recommended. The breaking up of the old furrows deeply, and making the new ridges on them, by which the two interchange places, provide a quantity of finely divided earth much greater than what is obtained in the ordinary mode. While the coming up of the corn is thereby facilitated, and the thrifty condition of the young plants secured, the depth at which the seeds of grass and weeds are deposited, prevents their germination, except in small numbers; hence labor and time in the culture of the crop are saved. In relation to maize, the author of "Arator" sums up the advantages of high ridges and deep furrows in substance as follows:—The roots are never cut in one direction, and this great depth of tilth thus early obtained, by superseding the occasion for deep plowing in the latter period of its growth, saves them in the other. The preservation of the roots, and their deeper pasture, enable the corn much longer to resist dry weather. Litter thrown into the deep furrow upon which the list is made, is a reservoir of manure, far removed from evaporation; within reach of the roots, which will follow it along the furrow, and calculated to feed the plants when in need of rain. The dead earth brought up by the plow from the deep furrow is deposited on each side of it, without hurting the crop on the ridge; farther, by one deep plowing, received by the corn after it is planted, being bestowed upon it while it is young, and its roots short, and being run nearly a foot from it, the roots of the corn in this way escape injury, and the effects of drouth on the plant being thus lessened, its product is increased.

It would appear from this condensed exposition of his views that, in the opinion of Taylor, one plowing only, and that a deep and early one, the growing crop requires. To clean and pulverize the soil, the harrow, skimmer, or cultivator, alone should be used. Each might advantageously be resorted to in any stage of its growth, but in a parched condition of the earth, their reviviscent tendency would then clearly demand it.

With regard to Sweet Potatoes, the plow may most profitably be employed at any time. When the shoots begin to wither, break up the space between the hills or ridges by running four furrows. The newly turned earth will be found wet in the morning, while before no moisture had been apparent. In a few days the leaves from being brown or yellow will assume a greenish hue, and new shoots ordinarily may be expected to follow.

3d. *Manure.*—The fertility of the soil is the first object to be attained by the farmer. For their dividing properties all fossil manures are highly esteemed. Deep plowing and lime, unaided by organic matter, it is well attested, have renovated lands that, in the judgment of the former proprietors, were not worth the labor of cultivation. In reference to the special matter under consideration, a judicious admixture of soils is of primary importance. Clay applied to sand assists it in retaining manure, and receiving the vaporized water of the atmosphere. To allow the fibres of plants to shoot freely, clay, sand and lime, acting mechanically by their mixture, are mutual manures to each other. Burnt clay may beneficially be substituted for sand.

It has already been observed, that pulverized earth has a strong attraction for atmospheric vapor, and that this increases in proportion to the minuteness into which the particles are divided; but as the power of the most fertile soils, in this respect, is inferior to that of even the worst ordinary manure, it is evident that "for the mere purpose of withstanding long-continued dry weather, those plants whose roots have immediate access to organic manures, will be much better enabled to absorb the necessary supplies of atmospheric moisture, than those merely vegetating in the unmanured soil;" hence, whenever fertilizers are employed in anticipation of drouth, or to mitigate its evils, in either case, the good to flow from their application to Corn will depend in a high degree upon their abundance, and the materials that compose them. The richer the ingredients and larger the quantity, the more decided will be the benefit. Suppose in a propitious season one acre, judiciously manured, to yield 50 bushels, and five acres, of the same natural strength, unassisted by art, 10 bushels per acre; experiments and practice prove that in a drouth the former will produce generally not fivefold, but seven or eight times as much as the latter. I may indeed assert, that the difference in product will be commensurate with the heat and dryness of the weather.

Whether manures should be buried deep or shallow, or lie on the surface, and whether they should be spread in a rotted or unrotted state, are questions which the occasion does not require me to investigate. The tendency of decomposing animal and vegetable matter is to rise in the atmosphere; of fossil manures to sink. As it is known that coarse litter is better adapted to corn than any other crop, if employed when putrefaction has commenced, immediately before the period of committing the seed to the ground, or in the fall, in the shape of long muck, to allow the frosts, rain and wind of winter to prepare it for the putrefactive process, every portion of the decaying and fermenting fertilizer will be gradually absorbed by the roots and leaves of the plants. All the facts that have come to my knowledge sustain conclusively the

* Liebig.

principles and reasoning I have advanced. I repeat that very rich ground rarely suffers materially for the want of water, especially if it has been properly divided and loosened by artificial means. If, therefore, the withering power of drouth should at any time show itself on poor land, let the farmer instantly apply putrescent manure on the surface of the ridge. To the spreading of compost without burying it over the cereals during their vegetation, the English attribute an almost magical influence. They assert that "the plants may almost be *seen* to renovate and regain their verdure." It is evident, says Thaër, that not only actual advantages, but also security against evil, is to be derived from the possession of an active manure of this nature, and without any sensible diminution of its value. Though the quantity may be small, yet the beneficial results first indicated in the change of color in the leaves, will soon appear. In the instance of a planter of this place, whose crop was in a perilous condition from the excessive dryness of the summer of 1844, one cart-load only to the acre of stable manure, partially decomposed, was instrumental in producing a fine yield, while from the remainder of the field the harvest was very meager. When the application was made the corn had begun to tassel; the stalks were small and the leaves yellow and curled. Although the former never increased in size, the latter soon exhibited a healthy green. This favorable indication took place before the first shower of rain, which was slight, and occurred about a fortnight after the trial of the experiment. The secret of my friend's success is traceable to the fact that, as all fertilizers have a strong attraction for atmospheric moisture, he used the one which of all others, in that respect, guano excepted, possesses the greatest power.

A prominent error in Southern Husbandry is over-planting. Manuring, consequently, as a system, is not practiced. This alone is sufficient to account for the smallness of the aggregate crop for the extent of ground annually in tilth. Reformation on this head is therefore loudly demanded. But until this ensue, what is to be done? in what way may the injurious operation of drouth be modified, as well by the ignorant as the skillful, the poor and the rich?

4th. *Salt.*—In small quantities, salt is a septic; in large quantities it resists putrefaction. Though not strictly germane to the subject entrusted to my charge, I hope I shall be excused for here stating the estimation in which this substance is held by many observant agriculturists. It destroys, they maintain, noxious weeds and vermin; gives luxuriance and verdure to grass lands; prevents the scab in (Irish) potatoes; sweetens grass, and hastens the maturity of crops. Wheat or barley following turnips on land been previously salted, the ensuing crop, it is well authenticated, escaped the mildew. For a top dressing for grass land, six bushels per acre are recommended; for cleaning the ground preparatory to the putting in of the grain, sixteen bushels, it is said, may be employed upon fallows. An ounce of salt to a gallon of water benefits vegetables; a larger quantity gives a brown color, and is therefore injurious. As it is a stimulant, salt should be mixed with compost, mud, or loamy earth. Its great capacity for inhaling atmospheric moisture renders it peculiarly valuable in dry and hot weather. For cotton I have used it successfully at the rate of five pecks to the acre. Beyond that, its effects were adverse to the growth and production of the plants. Manure designed for corn, should receive, several weeks before it is put on the land, as much salt as will furnish to every acre not exceeding one and a half bushels. If, however, none of the measures noticed in this communication have been adopted by the farmer, and his crop be suffering from the absence of rain, let him sprinkle on the ridge of each plant or hill as much well pulverized salt as he can conveniently take up with the thumb and two fore fingers. In a short time the result, from my own experience and that of some of my co-laborers, will be the same as though the ground had been recently moistened with a moderate shower. How long the benefit will continue I am unprepared to state, for after every experiment of my own, rain fell from ten to fifteen days. I can only assert that, in the interval, the salted portion of the field was in every respect much superior to the remainder.

5th. *Organic Absorbents.*—It is not merely necessary that atmospheric gases should be inhaled by the agents which the vigilant care of the farmer may have provided, but to render his labors and knowledge more effectual, they must possess the additional merit of retaining them. The atmosphere is the matrix of manures; these, however, are so subtle and evanescent, that they quickly escape, unless elaborated into permanency by the use of vegetables in a hardened form. The valuable properties of organic matter in a state of putrefaction, if buried in the earth, are absorbed by plants, and "exactly that portion of manure which is lost by the custom of rotting it before it is employed, becomes the parent of a great crop." The most common and yet the most esteemed retentive atmospheric absorbent with which I am acquainted, is the leaves of the pine.* When mixed with farmyard or stable manure, especially if a little salt has been added, it forms a highly fertilizing compound. In attracting and preserving the gases and vapor of the atmosphere, lies, however, its great virtue. In a drouth, if applied a few inches thick around each hill of corn, considerable moisture, under the heaps, will be seen in 24 hours, and shortly afterward the field, should the farmer's operations have been so extensive, will prove the efficacy of this simple experiment. At the late session of the Legislature, a member of the Senate informed me, that the last summer he employed pine leaves for his growing crop of potatoes with the happiest results. During the drouth, he filled the alleys with this material. At the time of harvest, potatoes were found on the earth below the trash. Though unable to speak with precision of the difference between this section of his field and that on which no leaves had been placed, yet the product of the one was far greater than that of the other. To determine a question of vegetable reproduction, in 1841, near Brest in France, on a few rods of poor land, untilled and which received no ulterior attention, grains of wheat were strewed, and then covered with wheat straw about an inch thick. In despite of excessive drouths during the spring, prolonged and several times repeated, while all around was drooping and uncertain, the protected wheat sustained no injury. When the plants matured, the straw was found to be "more than

* "Oak leaves," says Thaër, "are not easily decomposed, and contain an astringent matter which is highly injurious to vegetation as long as the leaf remains undecomposed."

6 feet high, and in the ears were 50, 60, and even 80 grains of wheat of full development." A satisfactory explanation of this experiment, remarks a French writer, is found in straw being a bad conductor of heat and a good conductor of electricity. The roots, consequently, were maintained in a medium temperature, and the moisture of the earth, furnished by the straw, facilitated the absorption of carbonic acid from the atmosphere. As pine leaves contain a much greater proportion of nutritive juices, they should always be used, if obtainable, in preference to the straw of other trees or any crop.

Having already extended this communication to an unreasonable length, I will merely add that the true and permanent interest of the agriculturist is to be found in preparing against the vicissitudes of the seasons, and not in weak and uncertain attempts to mitigate their influence. Deep plowing, loosening effectually the texture of the soil, and a bountiful supply of appropriate aliment are the surest means for the accomplishment of that purpose. While a parsimonious use of manure is sure to develop slender returns, it promotes slowly but inevitably the deterioration of the land. It is better, then, to cultivate a few acres to the plow or laborer, furnished abundantly with enriching materials, than treble the number without nutriment. These truths were practically enforced in the palmy days of Egyptian Agriculture. The Roman husbandman was considered blessed who owned seven acres of ground.

In England, twenty or thirty acres constitute a good farm, and in China for one-third of that quantity a large family is well supported. The grass lands in the immediate vicinity of Edinburgh rent for $100 the acre. In West Cambridge, Massachusetts, manure to the value of $100 per acre is supplied by many of the farmers, and instances are not unfrequent of ten acres, thus fertilized, yielding in money $5,000.* To us the full power of land is unknown; indeed, nowhere has it been ascertained that there is a limit to production. The period, perhaps, has arrived, when not only the advancement of their pecuniary welfare, but it may be, the preservation of the domestic institutions of the South depends on a radical change in the habits and practices of the tillers of its soil. If, in relation to this State, the distressing visitation of the last summer have the effect of arousing the attention of our agriculturists to the necessity of union among themselves, with a view to a free and full interchange of opinions in matters pertaining to their common vocation; they may yet have ample cause to be grateful to a merciful Providence for the calamity with which they have so recently and heavily been afflicted.

WHITEMARSH B. SEABROOK,
Pres. State Ag. Soc. of So. Ca.

* Farmer's Register.

PHILADELPHIA BUTTER:

ITS HIGH FLAVOR AND THE SOURCE WHENCE THIS IS DERIVED.

To the Editor of the Farmers' Library:

My Dear Sir: During one of your late visits to Philadelphia, we had some conversation relative to the rare qualities of Philadelphia Butter, which, though good at all times, is at one season distinguished by a peculiarly high and delightful flavor not to be found in the same degree, so far as I can learn, in Butter made in any other part of the Union. I told you that I thought I had discovered the source of this peculiarly grateful flavor, and now undertake to redeem a promise made to write you on the subject.

In the first place, I wish you to bear in mind that the original settlers in the old counties adjacent to Philadelphia were chiefly from Wales, and hence may claim a legitimate right to excel in the processes of the dairy. They took up their abodes among the hills, and as indispensable appendages of their farm houses, built what they call "Spring Houses," over the natural fountains flowing out of the hill-sides. These are shaded by wide-spreading trees tending to preserve the coolness imparted by the water surrounding the vessels containing the milk, cream, and other dairy products. A temperature is thus secured for the cream established by experiments as the most favorable to the perfect operation of churning, namely, the range from 50° to 65°—beginning with the cream at or near the first-named degree, and terminating the process with the temperature at 65°. It is only after the butter has "come," that warm water is to be added so as to raise the warmth to 70° or 75°. This is to facilitate the separation of the Butter from the milk. No one who has ever visited Pennsylvania Spring-Houses and observed the coolness and cleanliness they usually display, can doubt the great advantages afforded by them for dairy purposes.

But, though these circumstances may serve to improve the general qualities of Philadelphia Butter, still they are by no means concerned in producing that delightful flavor, the immediate cause of which is the main point to which I now wish to call your attention. As before intimated, it is only at one season that the flavor is in greatest perfection, and hence our housekeepers call it "May Butter," and sometimes "Grass Butter." The limits of the season of highest flavor may be set from about the middle of April to the middle of June. Now it is precisely during this time that the old, unplowed meadows and pasture fields in the vicinity of Philadelphia abound with a species of grass so highly odoriferous as to have

obtained the name of *Sweet-scented Vernal Grass*. Botanists call it *Anthoxanthum odoratum*. The scent somewhat resembles that of vanilla. It grows about a foot or eighteen inches high, rising above the surrounding grass. Its stem is very small and round, with a few long and slender leaves. Its odor will alone be sufficient to distinguish it from all other grasses found in our pastures. When in blossom, the air is often highly charged with its scent, and at this time I seldom ride into the country without gathering a handful of the grass to enjoy its rich perfumes at leisure, and perhaps store it away in a drawer. As it is so very forward in its growth, so does it show the earliest signs of decay. About the middle of June the fields and meadows where it abounds assume a yellowish appearance from the dying of the stems of the first growth. The cattle press these aside to get at greener herbage, and now the high flavor of our Butter declines.

The Sweet-scented Vernal Grass is a native of Europe, whence it has doubtless been introduced into the vicinity of Philadelphia, blended probably with other grass seeds. It has long become naturalized, and now occurs among other spontaneous herbage, disputing the right of soil with the common green grass, and never yielding possession till turned under by the plow, after which it clings to the unbroken fence and head-rows. Though seldom, if ever regularly sown here, it constitutes a part of the growth of most English pastures, thriving in nearly every kind of soil. The sweet odor for which English meadow hay is so noted, comes from the admixture of this grass. It is, however, seldom, if ever sown by itself, but usually mixes with the seeds of other grasses adapted to the formation of permanent pastures. It ranks rather low on account of nutritious properties, but is principally esteemed for its early growth, and continuing to throw up fresh shoots till the end of autumn. Indeed, the aftermath, or second growth, is particularly prized for grazing purposes.

A chemical examination of the Sweet-scented Vernal Grass shows that while its nutritious properties are less than those of most other grasses, it is distinguished from these by containing *benzoic acid*, or *flowers of benzoin*, a substance possessing a peculiarly agreeable aromatic odor. An essential oil in which this resides can be distilled from the grass, affording a pleasant perfume. It is undoubtedly this aromatic ingredient that imparts to the milky secretion of the cow the flavor so pleasantly manifested in Philadelphia Spring-Grass Butter. When we find milk so readily imbued with the peculiar flavors of garlic, turnips and other substances upon which cows often feed, there can be no room to doubt that a fragrant grass freely eaten by cows should likewise impart its particular flavor to the milky secretion.

If this very simple solution of the cause of the high flavor of Philadelphia Spring Butter be true—and I have not the least doubt upon the subject, you can at once perceive that a pasture grass may be introduced almost every where, which will communicate an exquisite flavor to Butter.

In London, Epping and Cambridge Butter are both greatly extolled for their high and delicate flavor. The cows producing the former, which is most esteemed, graze during summer in the wild pastures of Epping Forest, and the high flavor of their Butter has been commonly ascribed to the wild shrubs, plants, and leaves of trees which they feed upon. The Cambridge Butter is also produced from cows that graze upon natural pastures, one part of the year on uplands, and the other in rich meadows. As the Sweet-scented Vernal Grass is common to the natural pastures of England, I doubt not it may be found most abundant in those of Epping, Cambridge and other places most celebrated for high-flavored Butter. So far as I can find by inquiry and research in English books, the particular grass which contributes the greater part, if not all the fine high flavor to the best and most costly Butter, has never, as yet been identified. Without such exact knowledge this flavor of Butter must necessarily remain beyond the control of the agriculturist, wherever Nature or accident has not provided the pastures with the aromatic agent.

I remain very respectfully yours, &c.
G. EMERSON.

PLOWING.—I think I may say that in England and Scotland the art of plowing has reached perfection, and that it is unrivaled and unsurpassable. This, at least, is my opinion, which must be taken at what it is worth. I cannot conceive how it can be improved; and this not in rare instances, and at plowing matches, but I may say universally. In some cases, the work has been done better than in others; but I have not seen an example of bad plowing in the country; I have not seen one which, in the United States, would not be pronounced superior.

A ruffle from under a crimping-iron does not present a more beautiful object than a well-plowed field from under the hands of an English or a Scotch artist. The lines are all straight; the furrows well turned; the headlands cross-plowed; the corners finished. A well-disciplined mind enjoys the highest pleasure from seeing an operation of any kind, even the most humble, well performed, and perfected according to its proper measure.

There is something, likewise, extremely gratifying in witnessing the progress and advancement of human skill and art. From digging the ground with a stick, that a hole might be made for the deposit of the seed, to the perfect inversion of it by the plow, what an immense stride!

[Colman's European Agriculture.

hair*pointing upward, are longer and wider than those in the preceding Order; the one on the right not so long as the other.

Eighth Order.—These Cows, while at the hight of their flow, yield *three litres* a day, and continue to give milk until they have conceived anew.

The escutcheon is still defined, but on a very small scale. If the marks of upward growing hair (F F) at the sides of the vulva exist at all, they consist of a few bristling hairs, projecting crosswise.

COW OF MEDIUM HIGHT.

First Order.—Cows of this Order, while at the hight of their flow, yield *fourteen litres* a day, and continue to give milk until they are eight months gone with calf.

Second Order.—These Cows yield *twelve litres* a day, and continue to give milk until they are seven months gone with calf.

Third Order.—These Cows yield *ten litres* a day, and continue to give milk until six months gone with calf.

Fourth Order.—These Cows yield *eight litres* a day, and continue to give milk until five months gone with calf.

Fifth Order.—These Cows yield *six litres* a day, and continue to give milk milk until they are four months gone with calf.

Sixth Order.—These Cows yield *four litres* a day, and continue to give milk until three months gone with calf.

Seventh Order.—These Cows yield *three litres* a day, and cease to give milk upon being got with calf.

Eighth Order.—These Cows yield still less, and go dry upon conceiving anew.

LOW COW.

First Order.—These Cows yield, while at the hight of their flow, *eleven litres* a day; and continue to give milk until they are eight months gone with calf.

Second Order.—These Cows yield *nine litres* a day, and continue to give milk until seven months gone with calf.

Third Order.—These Cows yield *seven litres* a day, and continue to give milk until six months gone with calf.

Fourth Order.—These Cows yield *five litres* a day, and continue to give milk until five months gone with calf.

Fifth Order.—These Cows yield *four litres* a day, and continue to give milk until four months gone with calf.

Sixth Order.—These Cows yield *three litres* a day, and continue to give milk until two and a half months gone with calf.

Seventh Order.—These Cows yield *two litres* a day, and their yield goes on diminishing until they conceive anew; at which time they go dry.

Eighth Order.—These Cows yield still less, and go dry at the same period.

BASTARD OF THE BICORN COW.

The marks F F possess the same properties for indicating the Bastards of this Fourth Class, as in regard to those of the Third. (See Plate IX. Fig. 5.)

*[*Concluded from page* 459.]

CLASS V.

The Demijohn Cow.

This name indicates the shape of the escutcheon of this class. It may strike the reader as queer; but it is significant, and serves to recall the figure of the characteristic mark of the Class, which very much resembles the outline of a demijohn. If my discovery is a useful one, habit will soon accustom people to this name, as well as to the others of my Eight Classes; and to those who may feel disposed to find fault with them, I will say, what matters it to you? the name is as nothing, the importance is altogether in the thing.

HIGH COW.

First Order.—Cows of this Order and Size, while at the hight of their flow, yield *sixteen litres* a day, and continue to give milk until they are eight months gone with calf.

The skin within the escutcheon has the same yellowish color as in the higher Orders of the preceding Classes. The udder is delicate, and covered with fine, downy hair. The escutcheon, consisting of a growth of ascending hair, begins between the four teats, and on the inner side of the legs, above the hock joint; as it extends upward it spreads upon the outer surface of the thighs to the points A A. (Plate V. Fig. 1.) From these points, the figure is bounded by right lines, to the points J J, which are distant from each other from five to six inches. From these points, the upward growing hair rises to the line N, where it is from two and a half to three and a quarter inches in width. This line is directly below the vulva, and distant from it about four inches. The wider the figure is at this place, and the nearer it approaches to the vulva, the better the Cow.

Above the hind teats are two ovals (E E), formed by descending hair, about four inches long, by nearly three inches in width. On the right and left of the vulva are two streaks of ascending hair (O O), nearly two and a half inches long, by less than half an inch in widih. The hair within these streaks is fine and short, and very distinct from the dascending hair that surrounds them.

Second Order.—These Cows yield, while at the hight of their flow, *fourteen litres* a day, and continue to give milk until they are seven months gone with calf.

The escutcheon differs from that of the First Order in being on a smaller scale. Above the teats there is but one oval (E), to the right, formed by descending hair. Of the two streaks of ascending hair (O O) alongside of the vulva, the one to the left is of the same dimensions as in the First Order; but the one to the right, although of the same width, is of but half the length.

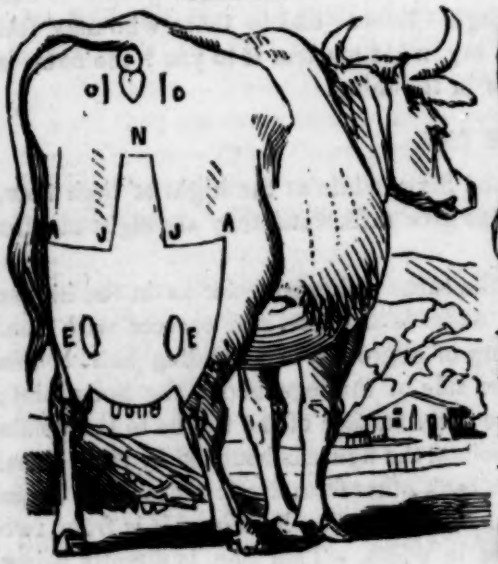
Third Order.—These Cows, while at the hight of their flow, yield *twelve litres* a day, and continue to give milk until they are six months gone with calf.

The escutcheon, preserving its general shape, is yet more contracted. At the points A A, it is more rounded off, and no longer spreads on the outer surface of the thighs. Above the points J J, it is narrower; and it stops short at N, considerably lower down beneath the vulva. There is but one of the streaks (O) of ascending hair, which is to the left of the vulva, and about an inch and a half long, by two-fifths of an inch in width.

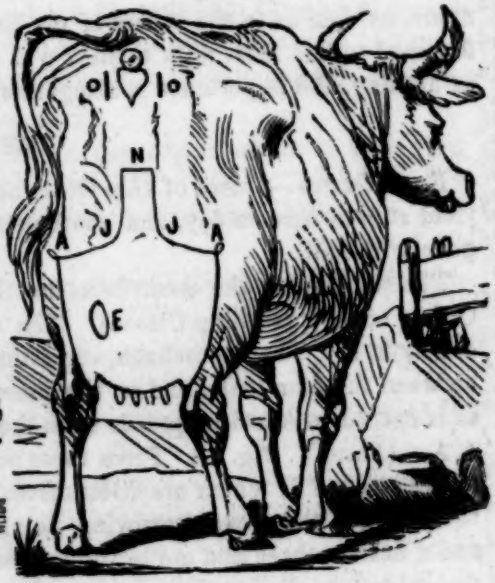
TABLE V.....CLASS 5.

The Demijohn Cow.

Order 1st.



Order 2d.



Order 5th.

Order 6th.

TABLE V.....CLASS 5.

The Demijohn Cow.

Order 3d.

Order 4th.

Order 7th.

Order 8th.

FOURTH ORDER.—These Cows, while at the hight of their flow, yield *ten litres* a day, and continue to give milk until they are five months gone with calf.

The escutcheon is yet more reduced in size. The points A A lower down and nearer together. The lines are more curved at the points J J, and the distance from these points to N is much less. Below A, on the right side, there is a failure of the upward growing hair, marked P.

FIFTH ORDER.—These Cows, while at the hight of their flow, yield *eight litres* a day, and continue to give milk until they are four months gone with calf.

The escutcheon goes on contracting in size. The points A A, being now on the inner surface of the thighs, are no longer so apparent. The upper extremity N is much farther below the vulva. At both points A A there is a failure of the ascending hair (P P), where its place is occupied by descending hair, running into the escutcheon. These marks are about five inches deep, by four in width.

Below the vulva there is a small streak of ascending hair (E), about an inch and a quarter long, by less than half an inch wide.

SIXTH ORDER.—These Cows, while at the hight of their flow, yield *six litres* a day, and continue to give milk until they are three months gone with calf.

The escutcheon is on a still more contracted scale than in the preceding Order. Near the vulva, to the left, there is a streak of ascending hair (F), which bristles up. It is nearly five inches long, by about one and a half in width.

SEVENTH ORDER.—These Cows, while at the hight of their flow, yield *four litres* a day, and continue to give milk until they are two months gone with calf.

The escutcheon is smaller and lower down than in the preceding Order. On the right and left of the vulva are two streaks of ascending hair, which bristles up. The one on the left (F) is somewhat longer than that found in the Sixth Order; the one on the right (C) is about four inches long, by an inch and a half in width. Below the point A, on the right hand, there is a failure of the ascending hair (P).

EIGHTH ORDER.—These Cows, while at the hight of their flow, yield *two litres* a day, and continue to give milk until they have conceived anew.

The escutcheon is hid away between the thighs; the points A A scarcely perceptible. The streaks of bristling hair (C C) on the right and left of the vulva are of the kind indicative of the degeneracy and bad quality of the Cow.

COW OF MEDIUM HIGHT.

FIRST ORDER.—These Cows, while at the hight of their flow, yield *fourteen litres* a day, and continue to give milk until they are eight months gone with calf.

SECOND ORDER.—These Cows yield *twelve litres* a day, and continue to give milk until they are seven months gone with calf.

THIRD ORDER.—These Cows yield *ten litres* a day, and continue to give milk until six months gone with calf.

FOURTH ORDER.—These Cows yield *eight litres* a day, and continue to give milk until five months gone with calf.

FIFTH ORDER.—These Cows yield *six litres* a day, and continue to give milk until four months gone with calf.

SIXTH ORDER.—These Cows yield *five litres* a day, and continue to give milk until three months gone with calf.

SEVENTH ORDER.—These Cows yield *three litres* a day, and continue to give milk until two months gone with calf.

EIGHTH ORDER.—These Cows yield still less, and go dry upon being got with calf.

LOW COW.

First Order.—These Cows, while at the hight of their flow, yield *ten litres* a day, and continue to give milk until they are eight months gone with calf.

Second Order.—These Cows yield *eight litres* a day, and continue to give milk until seven months gone with calf.

Third Order.—These Cows yield *six and a half litres* a day, and continue to give milk until six months gone with calf.

Fourth Order.—These Cows yield *five litres* a day, and continue to give milk until five months gone with calf.

Fifth Order.—These Cows yield *four litres* a day, and continue to give milk until four months gone with calf.

Sixth Order.—These Cows yield *three litres* a day, and continue to give milk until three months gone with calf.

Seventh Order.—These Cows yield *two litres* a day, and continue to give milk until two months gone with calf.

Eighth Order.—These Cows yield *one litre* of milk a day, and go dry upon conceiving anew.

BASTARD OF THE DEMIJOHN COW.

When the streaks marked F F are found in the Cow of this Class, of the dimensions specified in the description of the Bastard of the *Curveline* Cow, they serve here also to detect the Bastard Cow; and her badness in regard to the rapid loss of her milk will be in proportion to the size of these streaks. The smaller they are, the less defective will she be in this respect. (See Plate IX. Fig. 6.)

CLASS VI.

The Square-Scutcheon Cow.

The name indicates the appearance of the escutcheon, the upper part of which is shaped like a carpenter's or mason's square.

HIGH COW.

First Order.—Cows of this Order and Size yield, while at the hight of their flow, *sixteen litres* a day, and they continue to give milk until they are eight months gone with calf.

The skin within the escutcheon is of the same yellowish color as in the superior Orders of the preceding Classes. The udder delicate, covered with short, fine hair. The escutcheon begins as in the foregoing Classes; and, rising from just above the hock joint, on the inner surface of the thighs, spreads outward to the points A A. (See Plate VI. Order 1.) Above those points it represents a square. A right line runs across to the points J J, distant from each other from five to six inches. Thence the figure is bounded by two right lines, which meet in an acute angle at the point E, distant about two inches from the vulva. Above that, to the left, the figure of a square is formed by two streaks of hair, E B and B C (the point C being at the orifice of the vagina); the former of which is about four inches long, by an inch and a quarter wide, and the latter from five to six inches long, by somewhat less than the same width.

Above the hindmost teats are two small oval marks (G G), formed by downward growing hair in the field of ascending hair. They are about five or six inches long, by two and a half wide. The hair within them is of a lighter color than that without.

The nearer the escutcheon approaches to the vulva, the better the Cow.

Second Order.—These Cows yield, while at the hight of their flow, *fourteen litres* a day, and continue to give milk until they are seven months gone with calf.

The escutcheon is the same as in the First Order, only somewhat reduced in size. The square figure near the vulva commences lower down, and is longer than the one just described. There is but one oval above the teats, to the left (G), of the same size as those in the First Order.

Third Order.—These Cows, while at the hight of their flow, yield *twelve litres* a day, and continue to give milk until they are six months gone with calf.

The escutcheon is the same in its general shape, but it is more contracted in all its parts, and does not extend so high up. The points A A are nearer to the inner surface of the thighs; and the escutcheon is narrower at the points J J, where the outline has acquired a curved character.

The angular space between J J and E is narrower than the streak E B, and shorter than B C. The latter is wider and longer than in the preceding Order.

Fourth Order.—These Cows yield, while at the hight of their flow, *ten litres* a day, and continue to give milk until they are five months gone with calf.

The escutcheon is still more reduced in size. To the right of the vulva there is a streak of bristling hair, growing upward (F), about four inches long, by one and a half wide. Below the point A, to the right, there is a space (U) where the upward growing hair fails, and is replaced by descending hair.

Fifth Order.—These Cows, while at the hight of their flow, yield *eight litres* a day, and continue to give milk until they are four months gone with calf.

The unfavorable marks are the same as in the preceding Order, only more conspicuous and on a larger scale.

Sixth Order.—These Cows, while at the hight of their flow, yield *six litres* a day, and continue to give milk until they are three months gone with calf.

The escutcheon is yet more contracted, confined to the inner surface of the thighs, and more distant from the vulva. To the right and left of this orifice are streaks or lines of ascending hair, coarse and bristling.

Seventh Order.—These Cows, while at the hight of their flow, yield *four litres* a day, and continue to give milk until they are two months gone with calf.

The escutcheon is smaller still. The streak of ascending hair (F) on the right is wider, and the hair more bristling.

Eighth Order.—These Cows yield, while at the hight of their flow, *two litres* a day, and go dry upon being got with calf.

The shape of the escutcheon is still perceptible; but it is very small, and hid away between the thighs.

COW OF MEDIUM HIGHT.

First Order.—These Cows, while at the hight of their flow, yield from *twelve* to *thirteen litres* a day, and they continue to give milk until they are eight months gone with calf.

Second Order.—These Cows yield *ten litres* a day, and continue to give milk until seven months gone with calf.

THIRD ORDER.—These Cows yield *eight litres* a day, and continue to give milk until six months gone with calf.

FOURTH ORDER.—These Cows yield *six litres* a day, and continue to give milk until five months gone with calf.

FIFTH ORDER.—These Cows yield *four and a half litres* a day, and continue to give milk until four months gone with calf.

SIXTH ORDER.—These Cows yield *three and a half litres* a day, and continue to give milk until three months gone with calf.

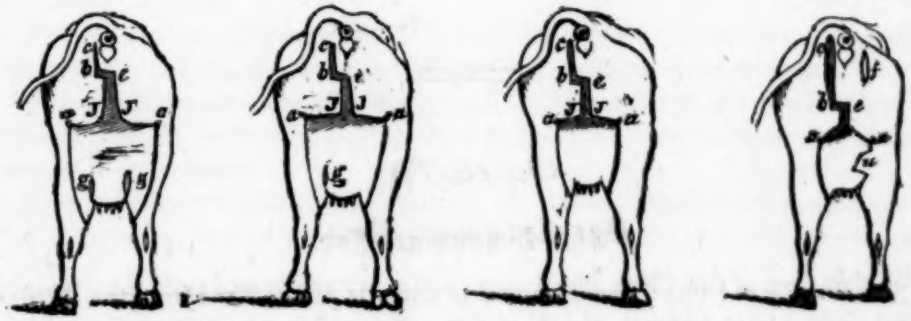
SEVENTH ORDER.—These Cows yield *two litres* a day, and continue to give milk until one month and a half advanced in gestation.

EIGHTH ORDER.—These Cows yield still less, and go dry upon being got with calf.

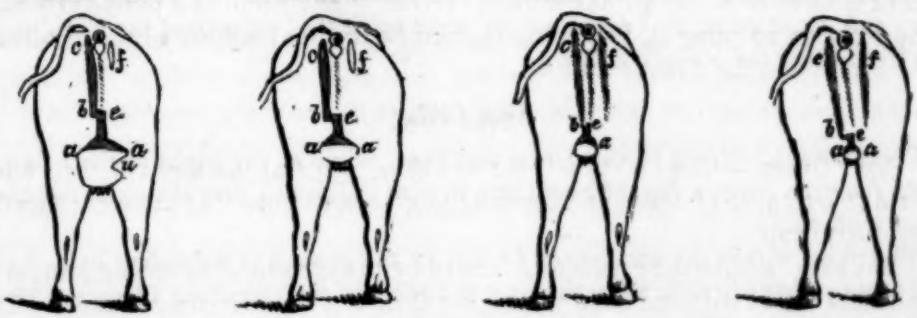
TABLE VI.....CLASS 6.

The Square-Scutcheon Cow.

Order 1st. Order 2d. Order 3d. Order 4th.



Order 5th. Order 6th. Order 7th. Order 8th.



LOW COW.

FIRST ORDER.—Cows of this Order and Size yield, while at the hight of their flow, *nine litres* a day; and they continue to give milk until they are eight months gone with calf.

SECOND ORDER.—These Cows yield *eight litres* a day, and continue to give milk until seven months gone with calf.

THIRD ORDER.—These Cows yield *six litres* a day, and continue to give milk until six months gone with calf.

FOURTH ORDER.—These Cows yield *four and a half litres* a day, and continue to give milk until five months gone with calf.

FIFTH ORDER.—These Cows yield *three and a half litres* a day, and continue to give milk until four months gone with calf.

SIXTH ORDER.—These Cows yield *two and a half litres* a day, and continue to give milk until three months gone with calf.

SEVENTH ORDER.—These Cows yield *one litre* a day, and continue to give milk until a month and a half advanced in gestation.

EIGHTH ORDER.—These Cows yield still less, and go dry upon being got with calf.

BASTARD OF THE SQUARE-SCUTCHEON COW.

When the streak (O) of ascending hair on the right of the vulva consists of coarse, bristling hair, this indicates a Bastard. She will lose her milk the more promptly in proportion to the size of this growth of bristling hair, to the coarseness of the hair, and to the degree in which it bristles up and projects over; but, wherever this sign exists, the Cow will lose her milk, more or less gradually, a short time after being impregnated. The indication of this will be the more positive if the streaks above described as forming the square, to the left of the vulva, also consist of coarse, bristling hair.

CLASS VII.

The Limousine Cow.

The first Cow of this Class which came under my notice was from the Province whose name I have adopted as that of the Class. It is not to be inferred, however, that none but the Cows of Limousin belong to the Class. Its characteristic mark is to be found in all the different breeds. The name is a purely arbitrary one; and, in adopting it, I acted in the same spirit that influenced me in calling my First Class the *Flanders* Cow.

HIGH COW.

FIRST ORDER.—Cows of this Order and Size, while at the hight of their flow, yield *fourteen litres* a day, and continue to give milk until they are eight months gone with calf.

The skin, within the escutcheon formed by the growth of ascending hair, is of the same yellowish color as in the nigher Orders of the preceding Classes. The udder is delicate, and covered with short, fine, and silky hair. The growth of ascending hair begins between the teats, and on the inner side of the legs, above the hock joint, spreading outwardly, as it rises, to the points A A (see Plate VII. Order 1), on the outer surface of the thighs. From these points the escutcheon is bounded by two right lines, which run slanting downward to the points J J, which are about four inches apart. From these points two right lines rise to the point O, somewhat less than three inches below the vulva, where they meet in an acute angle.

To the right and left of the vulva are two small streaks of ascending hair (C C), about three inches or less in length, by two-fifths of an inch in width. Above the hind teats are two ovals of descending hair (G G), about four inches long,

by two and a half inches in width. They are very distinguishable, by means of the whitish color of the hair within them.

These streaks, to the right and left of the vulva, do not always occur in Cows of the First Order; and they are not, therefore, to be considered as an indispensable part of the characteristic marks of this Order. The escutcheon itself, even, is sometimes imperfectly defined, and yet the Cow proves herself to be of the First Order.

Second Order.—These Cows, while at the hight of their flow, yield *twelve litres* a day, and continue to give milk until they are seven months gone with calf.

The characteristic marks are the same as in the First Order; the escutcheon, however, being on a smaller scale. The streaks (C C) to the right and left of the vulva are shorter and wider.

Third Order.—These Cows, while at the hight of their flow, yield *ten litres* a day, and continue to give milk until they are six months gone with calf.

The escutcheon is the same in shape, but more contracted. The streak (C) the vulva, to the left, is nearly five inches long, by upward of an inch in width. On the right of the vulva is a small patch of ascending hair (E), nearly three inches long, by upward of an inch in width. The point O is about six inches distant from the vulva.

Fourth Order.—These Cows, while at the hight of their flow, yield *eight litres* a day, and continue to give milk until five months gone with calf.

The escutcheon is on a still smaller scale. There is but one streak (C) of ascending hair by the vulva, on the left, which is eight inches long, by something over an inch in width.

Fifth Order.—These Cows, while at the hight of their flow, yield *six and a half litres* a day, and continue to give milk until they are four months gone with calf.

The escutcheon is smaller, lower down, and confined to the interior surface of the thighs. If any streaks of ascending hair occur, on the right and left of the vulva, they consist of bristling hair, and are longer and wider than in the preceding Order.

Sixth Order.—These Cows, during the hight of their flow, yield *five litres* a day, and continue to give milk until they are three months gone with calf.

The escutcheon preserves its shape, but is still more contracted in its dimensions. The point O is lower down. On the left of the vulva is a streak of bristling hair, growing upward (F).

Seventh Order.—These Cows, while at the hight of their flow, yield *four litres* a day, and continue to give milk until they are one month gone with calf.

The escutcheon is smaller still. The streaks of ascending hair (F F) on the right and left of the vulva are wider, by about an inch, than those above described, and the hair is coarse and bristling.

Eighth Order.—These Cows, while at the hight of their flow, yield *two litres* a day, and go dry upon being got with calf.

The escutcheon is so small, and hid away between the thighs, as to be barely perceptible. The streaks of ascending hair (F F) are still longer and wider than in the Seventh Order.

COW OF MEDIUM HIGHT.

First Order.—The Cows of this Order and Size, while at the hight of their flow, yield *eleven litres* a day, and continue to give milk until they are eight months gone with calf.

Second Order.—These Cows yield *nine litres* a day, and continue to give milk until seven months gone with calf.

Third Order.—These Cows yield *seven and a half litres* a day, and continue to give milk until six months gone with calf.

Fourth Order.—These Cows yield *five and a half litres* a day, and continue to give milk until five months gone with calf.

Fifth Order.—These Cows yield *four litres* a day, and continue to give milk until four months gone with calf.

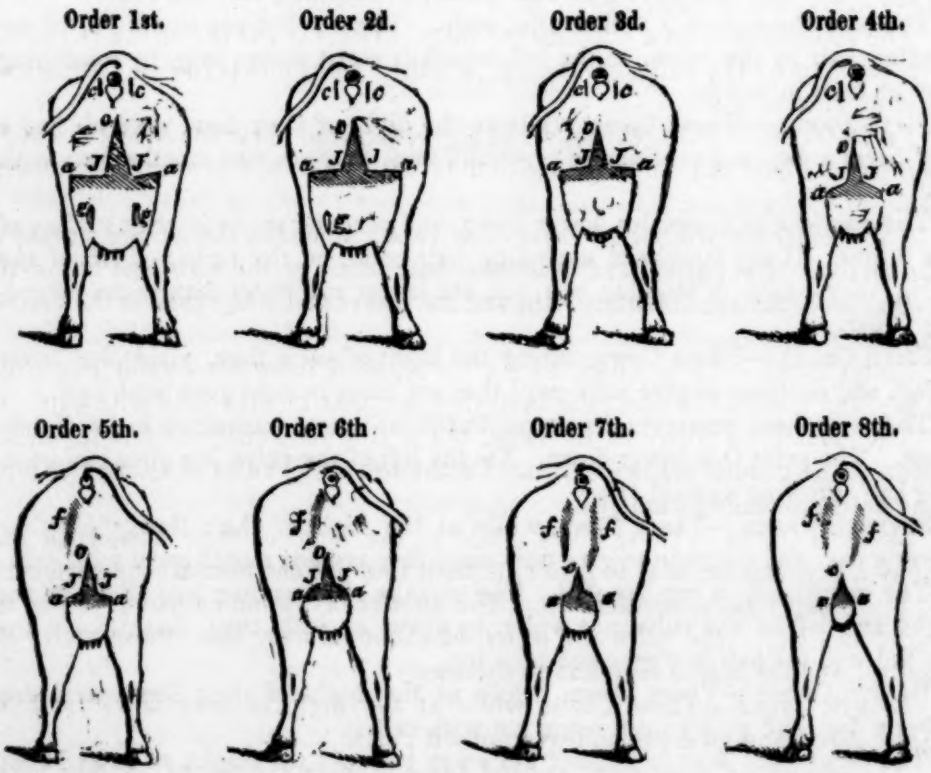
Sixth Order.—These Cows yield *three litres* a day, and continue to give milk until three months gone with calf.

Seventh Order.—These Cows yield *two litres* a day, and continue to give milk until two months gone with calf.

Eighth Order.—These Cows also yield *two litres* a day, and go dry upon being got with calf.

TABLE VII.....CLASS 7.

The Limousine Cow.



LOW COW.

First Order.—The Cows of this Order and Size yield, while at the hight of their flow, *eight litres* a day, and continue to give milk until eight months gone with calf.

Second Order.—These Cows yield *seven litres* a day, and continue to give milk until seven months gone with calf.

THIRD ORDER.—These Cows yield *six litres* a day, and continue to give milk until six months gone with calf.

FOURTH ORDER.—These Cows yield *five litres* a day, and continue to give milk until five months gone with calf.

FIFTH ORDER.—These Cows yield *four litres* a day, and continue to give milk until four months gone with calf.

SIXTH ORDER.—These Cows yield *three litres* a day, and continue to give milk until three months gone with calf.

SEVENTH ORDER.—These Cows yield *two litres* a day, and continue to give milk until one month gone with calf.

EIGHTH ORDER.—These Cows yield *one litre* a day, and go dry upon being got with calf.

BASTARD OF THE LIMOUSINE COW.

In this Class also, as in the *Curveline* and *Bicorn* Classes, the Bastard is indicated by the streaks of ascending hair (F F) to the right and left of the vulva; which streaks are of the same dimensions and of the same character generally as in those Classes. (See Plate IX. Fig. 8.)

CLASS VIII.

The Horizontal Cut Cow.

I have given this name to those Cows whose escutcheon is bounded at top by a horizontal line, which cuts the ascending hair square off just when it has spread to its greatest width, The figure (Plate VIII.) will be seen to be very different from that of the other Classes.

HIGH COW.

FIRST ORDER.—The Cows of this Order and Size, during the hight of their flow, yield *twelve litres* a day, and they continue to give milk until they are eight months gone with calf.

The skin within the escutcheon, and the dandruf from it, are of a reddish yellow. The ascending hair is short and fine; the skin beneath it quite silky; the four teats far apart. As in the other Classes, the ascending hair which forms the escutcheon begins between the four teats, and on the inner surface of the thighs, a little above the hock joint—spreading out, as it rises, to the points E E, on the outer surface of the thighs. Here it is cut short off, by a transversal or horizontal line, running across from one thigh to the other.

Although the escutcheon does not rise, as in the other Classes, to or near the vulva, we nevertheless find, on the right and left of that orifice, the two streaks of ascending hair (C C), which are so valuable, as an indication of the character of the Cow, in regard to the period during which she will continue to give milk after becoming pregnant: this point being determined by the size of these marks and the nature of the hair within them. In the present Order they consist of fine hair, and are from three and a quarter to four inches in length, by less than half an inch broad.

Above the hind teats are two little oval marks (B B), consisting of downward growing hair, distinguishable by its whitish color as well as by the direction in which it points.

Second Order.—These Cows, while at the hight of their flow, yield *ten litres* a day, and continue to give milk until they are seven months gone with calf.

The escutcheon is the same in shape as that of the First Order, but contracted in its dimensions. The streaks (C C) on the right and left of the vulva are unequal in size—the one on the left being of the same length as in the First Order, while the one on the right is considerably shorter.

In several of the Orders there is, immediately under the vulva, and touching it, a small streak of ascending hair (N), about two inches in length, by less than half an inch in breadth.

Third Order.—These Cows, while at the hight of their flow, yield *eight litres* a day, and continue to give milk until they are six months gone with calf.

The escutcheon is the same in shape, but more contracted still; the points E E are lower down and nearer together. Alongside of the vulva there is but one streak of ascending hair (G), which bristles up and projects over. This mark is from five to six inches long, by from four-fifths to six-fifths of an inch in width.

On the inner surface of the right thigh, beginning at the point A, there is a failure of the upward growing hair, which is replaced by descending hair. This downward growth of hair is wedge-shaped, pointing toward the udder; it is about eight inches long, by four inches in width. The hair is very distinguishable by its whitish color.

Although I have taken this place to make it known, this mark does not always occur in Cows of this Order, nor is it peculiar to those of the present Class.—Whenever it is found, let the Cow be of whatever Class or Order she may, it indicates that her daily yield of milk will fall about one-third short of the quantity set down as proper to a Cow of that Class and Order.

Fourth Order.—These Cows, while at the hight of their flow, yield *six litres* a day, and continue to give milk until they are four and a half months gone with calf.

The escutcheon is smaller and lower down than in the Third Order. There is but one streak (N) of upward growing hair, which is betwixt the thighs, in a line with the vulva, and about two or two and a half inches from it. It is about four inches long, by four-fifths of an inch in breadth. Within the escutcheon there are two failures (A A) of the upward growing hair, like the one above described—that on the right being larger than the other.

Fifth Order.—These Cows, while at the hight of their flow, yield *five litres* a day, and continue to give milk until they are three and a half months gone with calf.

The escutcheon is smaller still, and lower down. On the left of the vulva there is a streak (F) of upward growing hair, coarse and bristling. This mark is about six inches long, by an inch and a half in width.

It is to be observed, in regard to the streaks alongside of the vulva, that when they occur in a Cow of an inferior Order, such as they are described to be in the Cow of the First Order; in this case, whatever may be the inferiority of the Cow as to the quantity of her daily yield, she will continue to give her milk just as a Cow of the First Order would. That is to say, she will be just as long in going dry, after being got with calf, as a Cow of the First Order.

Sixth Order.—These Cows, while at the hight of their flow, yield *four litres* a day, and continue to give milk until they are two months gone with calf.

The escutcheon is smaller, lower down, and confined to the inner surface of the thighs. The longer and broader the streaks of ascending hair (F F) on the

right and left of the vulva, and the coarser and more bristling the hair, the worse the Cow will prove in regard to the time she will continue to give milk after being got with calf.

Seventh Order.—These Cows, while at the hight of their flow, yield *three litres* a day, and continue to give milk until one month gone with calf.

The escutcheon is still smaller than the last. The signs (F) of early drying up are the same as in the foregoing Order.

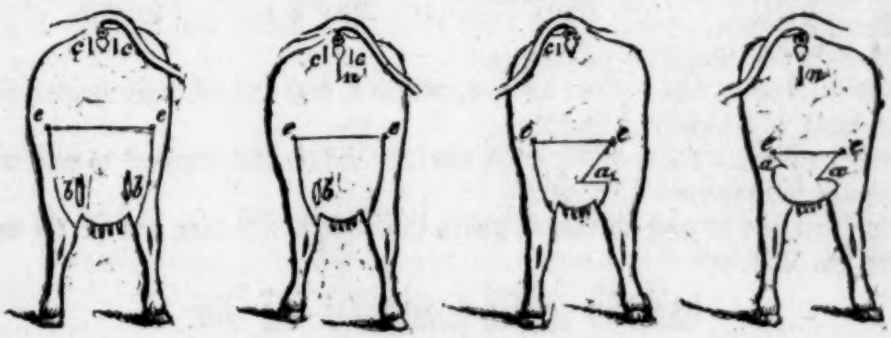
Eighth Order.—These Cows yield, during the hight of their flow, *two litres* a day, and go dry upon being got with calf.

The escutcheon is so hid away between the thighs as to be barely perceptible. Some coarse bristling hairs (F), which grow awry, are seen pointing toward the vulva.

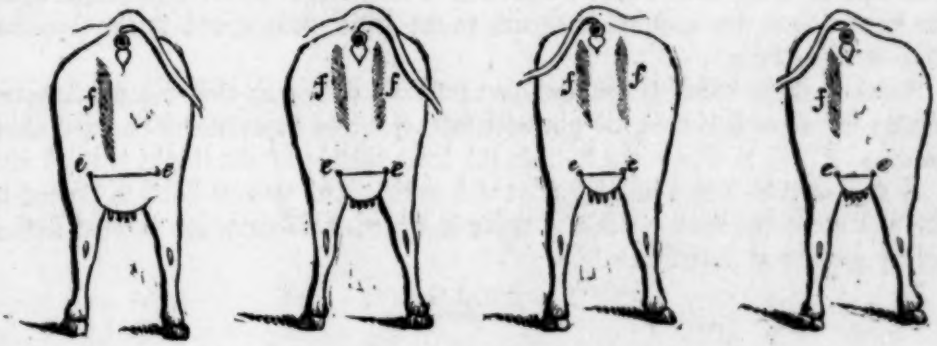
TABLE VIII.....CLASS 8.

The Horizontal Cut Cow.

Order 1st. Order 2d. Order 3d. Order 4th.



Order 5th. Order 6th. Order 7th. Order 8th.



COW OF MEDIUM HIGHT.

First Order.—These Cows yield, while at the hight of their flow, *nine litres* a day, and continue to give milk until they are eight months gone with calf.

Second Order.—These Cows yield *eight litres* a day, and continue to give milk until seven months gone with calf.

Third Order.—These Cows yield *seven litres* a day, and continue to give milk until five months gone with calf.

FOURTH ORDER.—These Cows yield *six litres* a day, and continue to give milk until four months gone with calf.

FIFTH ORDER.—These Cows yield *five litres* a day, and continue to give milk until three months gone with calf.

SIXTH ORDER.—These Cows yield *four litres* a day, and continue to give milk until two months gone with calf.

SEVENTH ORDER.—These Cows yield *three litres* a day, and continue to give milk until one month gone with calf.

EIGHTH ORDER.—These Cows yield *two litres* a day, and cease to give milk upon being got with calf.

LOW COW.

FIRST ORDER.—The Cows of this Order and Size, while at the hight of their flow, yield *six litres* a day, and continue to give milk until they are eight months gone with calf.

SECOND ORDER.—These Cows yield *five litres* a day, and continue to give milk until seven months gone with calf.

THIRD ORDER.—These Cows yield *four litres* a day, and continue to give milk until five months gone with calf.

FOURTH ORDER.—These Cows yield *three litres* a day, and continue to give milk until four months gone with calf.

FIFTH ORDER.—These Cows yield *two litres* a day, and continue to give milk until three months gone with calf.

SIXTH ORDER.—These Cows yield *one litre* a day, and continue to give milk until two months gone with calf.

SEVENTH AND EIGHTH ORDERS.—These Cows yield still less, and go dry upon being got with calf.

BASTARD OF THE HORIZONTAL CUT COW.

The Bastards of this Class have no escutcheon whatever. The entire space from the vulva to the udder, and on the inner surface of the thighs, is covered with hair growing downward; no growth of ascending hair is to be found upon the parts where the escutcheon occurs in the other Classes, and in the Genuine Cow of this Class.

Some of these Bastards are excellent milkers, so long as they are not impregnated; but so soon as they are got with calf, or a very short time afterward, they go dry. Those in whom the hair on the inner surface of the thighs is thick and very fine, will be found to give good rich milk. The reverse holds in regard to the quality of the milk yielded by those in whom these parts are covered with a scanty growth of coarse hair.

BASTARD BULLS.

Having attached to the portion of the work appropriated to each Class a description of the Bastard Cow belonging to it, I must indicate here the signs by which a Bastard Bull is to be known.

Bulls have escutcheons of the same shapes as those of the Cows; only, as I have already said, on a smaller scale. The growth of ascending hair which forms the escutcheon extends from the testicles upward, spreading on the inner

side of the thighs. Now, whenever streaks of descending hair occur in this field of ascending hair, giving rise to lines of bristling hairs, this is to be looked upon as an indication of imperfection or bastardy; and the indication will be certain, in proportion to the size and extent of these blemishes in the escutcheon. Those Bulls in which they do not occur, and whose escutcheons, at the same time that they are free from these streaks, ascend high up, and are well developed and defined; every such Bull is to be deemed genuine, and may be relied upon for the reproduction of animals of the highest order.

TABLE IX.

The Bastard Cow of the several Classes.

1st Class. Bastard Flanders Cow.

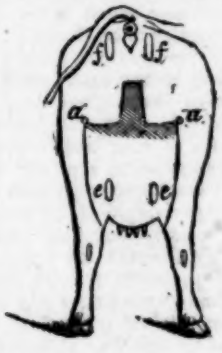
1st Class. Bastard Flanders Cow.

2d Class. Bastard Selvage Cow.

3d Class. Bastard Curveline Cow.

4th Class. Bastard Bicorn Cow.

5th Class. Bastard Demijohn Cow.



6th Class. Bast'd Sq. Scutch. Cow.

7th Class. Bast. Limousine Cow.

TABLE

SHOWING THE YIELD OF THE SEVERAL ORDERS OF EACH CLASS.

Class.	Ord. I.	II.	III.	IV.	V.	VI.	VII.	VIII....	Litres.	Qts.	Gills.
1. Flanders Cow.											
High	20	18	16	14	12	9	6	4.....	20	21	2
Medium	16	14	12	10	8	5	3	2.....			
Low	12	10	8	6	4	3	2	1.....	18	19	1
2. Selvage Cow.											
High	18	16	14	12	10	8	6	4.....	16	17	0
Medium	14	13	11	10	8	6	4	3.....			
Low	10	8	6	4	3	2	2	1.....	15	15	7½
3. Curveline Cow.											
High	18	16	14	12	10	7	5	3.....	14	14	7
Medium	18	13	11	9	7	5½	3½	2.....			
Low	12	10	8	6	5	4	3	2.....	13	13	6½
4. Bicorn Cow.											
High	16	14	12	10	8	6	4	3.....	12	12	6
Medium	14	12	10	8	6	4	3	2½.....			
Low	11	9	7	5	4	3	2	1½.....	11	11	5½
5. Demijohn Cow.											
High	16	14	12	10	8	6	4	2.....	10	10	5
Medium	14	12	10	8	6	5	3	2.....			
Low	10	8	6½	5	4	3	2	1.....	9	9	4½
6. Square-Scutcheon Cow.											
High	16	14	12	10	8	6	4	2.....	8	8	4
Medium	12	10	8	6	4½	3½	2	1½.....			
Low	9	8	6	4½	3½	2½	1	½.....	7	7	3½
7. Limousine Cow.											
High	14	12	10	8	6½	5	4	2.....	6	6	3
Medium	11	9	7½	5½	4	3	2	2.....			
Low	8	7	6	5	4	3	2	1.....	5	5	2½
8. Horizontal Cut Cow.											
High	12	10	8	6	5	4	3	2.....	4	4	2
Medium	9	8	7	6	5	4	3	2.....			
Low	6	5	4	3	2	1	less than 1	.....	3	3	1½

LABOR AND MACHINERY.

The effects of improved machinery should be to alleviate and to shorten human toil, and, in multiplying production, to supply more widely the supply of food, and the common comforts of life. The laboring man should, on every principle, be the first to share in these benefits; but far too often he is the last. Food is greatly multiplied both in quantity and variety; but in a country where labor is superabundant, the wages of labor become proportionately reduced, and the power to purchase restricted. There can be no doubt that, in respect to clothing and furniture, the condition of the laboring population is greatly improved above what it formerly was. An American clock, for example, made in Connecticut—that home of industry and the useful arts—an article both useful and ornamental, and in which the "gude" housewife is sure to take an honest pride, may be purchased in London for a pound. A century ago, this would have been an article of furniture which a nobleman might covet.

But it is too true that improved machinery scarcely diminishes—in many cases it increases—the demand for human and brute labor. Two men only are required to thresh grain with a flail; from five to eight, besides the horses, or the attendants upon the steam-engine, are employed at the threshing-machine. Much more is threshed, and, in consequence of these increased facilities, much more is grown, and therefore requires to be threshed. "But for the invention of the steam-engine, a large proportion of the coal mines now profitably worked could not have been opened, or must have been abandoned. It is well known that, by the consumption of one bushel of coals in the furnace of a steam-boiler, a power is produced which, in a few minutes, will raise 20,000 gallons of water from a depth of 350 feet—an effect which could not be produced in a shorter time than a whole day through the continuous labor of twenty men, working with the common pump. By thus expending a few pence, an amount of human labor is set free, to employ which would have cost fifty shillings; and yet this circumstance, so far from having diminished the demand for human labor, even in the actual trade where the economy is produced, has certainly caused a much greater number of persons to be employed in coal-mining than could otherwise have been set to work."

[Colman's European Agriculture.

From a Treatise in the "Store of Knowledge."

THE DISEASES OF THE HORSE.

BY WILLIAM YOUATT.

THE principal diseases of the Horse are connected with the circulatory system. From the state of habitual excitement in which the animal is kept, in order to enable him to execute his task, the heart and the blood-vessels will often act too impetuously; the vital fluid will be hurried along too rapidly, either through the frame generally, or some particular part of it, and there will be *congestion*, accumulation of blood in that part, or *inflammation*, either local or general, disturbing the functions of some organ, or of the whole frame.

Congestion.—Take a young Horse on his first entrance into the stables; feed him somewhat highly, and what is the consequence? He has swellings of the legs, or inflammation of the joints, or perhaps of the lungs. Take a horse that has lived somewhat above his work, and gallop him to the top of his speed; his nervous system becomes highly excited; the heart beats with fearful rapidity; the blood is pumped into the lungs faster than they can discharge it; the pulmonary vessels become gorged, fatigued, and utterly powerless—the blood, arrested in its course, becomes viscid, and death speedily ensues. We have but one chance of saving our patient—the instantaneous and copious abstraction of blood; and only one means of preventing the recurrence of this dangerous state, namely, not suffering too great an accumulation of the sanguineous fluid by over-feeding, and by regular and systematic exercise, which will inure the circulatory vessels to prompt and efficient action when they are suddenly called upon to exert themselves. The cause and the remedy are sufficiently plain.

Again, the brain has functions of the most important nature to discharge, and more blood flows through it than through any other portion of the frame of equal bulk. In order to prevent this organ from being oppressed by a too great determination of blood to it, the vessels, although numerous, are small, and pursue a very circuitous and winding course. If a horse highly fed, and full of blood, is suddenly and sharply exercised, the course of the blood is accelerated in every direction, and to the brain among other parts. The vessels that ramify on its surface or penetrate its substance are completely distended and gorged with it. Perhaps they are ruptured, and the effused blood presses upon the brain; it presses upon the origins of the nerves on which sensation and motion depend, and the animal suddenly drops powerless. A prompt and copious abstraction of blood, or, in other words, a diminution of this pressure, can alone save the patient. Here is the nature, the cause, and the treatment of *apoplexy*.

Sometimes this disease assumes a different form. The horse has not been performing more than his ordinary work, or perhaps he may not have been out of the stable. He is found with his head drooping and his vision impaired. He is staggering about. He falls, and lies half unconscious, or he struggles violently and dangerously. There is the same congestion of blood in the head, the same pressure on the nervous origins, but produced by a different cause. He has been accustomed habitually to overload his stomach, or he was, on the previous day, kept too long from his food, and then he fell ravenously upon it, and ate until his stomach was completely distended and unable to propel forward its accumulated contents. Thus distended, its blood-vessels are compressed, and the circulation through them is impeded or altogether suspended. The blood is still forced on by the heart, and driven in accumulated quantity to other organs, and to the brain among the rest; and there congestion takes place, as just described, and the animal becomes sleepy, unconscious, and, if he is not speedily relieved, he dies. This too is apoplexy; the horseman calls it *stomach staggers*. Its cause is improper feeding. The division of the hours of labor, and the introduction of the *nose-bag*, have much diminished the frequency of its occurrence. The remedies are plain,—bleeding, physicing, and the removal of the contents of the stomach by means of a pump contrived for that purpose.

Congestions of other kinds occasionally present themselves. It is no uncommon thing for the blood to loiter in the complicated vessels of the *liver*, until the covering of that viscus has burst, and an accumulation of coagulated black blood has presented itself. This congestion constitutes the *swelled legs* to which so many horses are subject when they stand too long idle in the stable, and it is the source of many of the accumulations of serous fluid in various parts of the body, and particularly in the chest, the abdomen, and the brain.

Inflammation is opposed to *congestion*, as consisting in an active state of the capillary arterial vessels; the blood rushes through them with far greater rapidity than in health, from the excited state of the nervous system by which they are supplied.

Inflammation is either *local* or *diffused*. It is confined to one organ, or to a particular portion of that organ; or it involves many neighboring ones, or it is spread over the whole frame. In the latter case it assumes the name of *fever*. Fever is general or constitutional inflammation, and is said to be *sympathetic* or *symptomatic* when it can be traced to some local affection or cause, and *idiopathic* when we cannot so trace it. The truth probably is, that every fever has its local cause, but we have not a sufficient knowledge of the animal economy to discover that cause.

Inflammation may be considered with reference to the membranes which it attacks.

The *mucous membranes* line all the cavities that communicate with the external surface of the body. There is frequent inflammation of

the membrane of the mouth. *Blain*, or *Glossanthrax*, is a vesicular enlargement which runs along the side of the tongue. Its cause is unknown. It should be lanced freely and deeply, and some aperient medicine administered.—*Barbs*, or *paps*, are smaller enlargements, found more in the neighborhood of the bridle of the tongue. They should never be touched with any instrument; a little cooling medicine will generally remove them. *Lampas* is inflammation of the palate, or enlargement of the bars of the palate. The roof of the mouth may be slightly lanced, or a little aperient medicine administered: but the sensibility of the mouth should never be destroyed by the application of the heated iron. *Canker* and *wounds in the mouth* from various causes, will be best remedied by diluted tincture of myrrh, or a weak solution of alum.

Foreign bodies in the gullet may generally be removed by means of the probang used in the hoove of cattle; or the œsophagus may be opened, and the obstructing body taken out.

It is on the mucous membranes that *poisons* principally exert their influence. The *yew* is the most frequent vegetable poison. The horse may be saved by timely recourse to equal parts of vinegar and water injected into the stomach, after the poison has been as much as possible removed by means of the stomach-pump. For arsenic or corrosive sublimate there is rarely any antidote.

Spasmodic colic is too frequently produced by exposure to cold, or the drinking of cold water, or the use of too much green meat. The horse should be walked about, strong friction used over the belly, and spirit of turpentine given in doses of two ounces, with an ounce each of laudanum and spirit of nitrous ether, in warm water or ale. If the spasm is not soon relieved the animal should be bled, an aloetic ball administered, and injections of warm water with a solution of aloes thrown up. This spasmodic action of the bowels, when long continued, is liable to produce *introsusception*, or *entanglement*, of them, and the case is then hopeless.

Superpurgation often follows the administration of a too strong or improper dose of physic. The torture which it produces will be evident by the agonized expression of the countenance, and the frequent looking at the flanks. Plenty of thin starch or arrow-root should be given both by the mouth and by injection; and, twelve hours having passed without relief being experienced, chalk, catechu, and opium should be added to the gruel.

Worms in the intestines are not often productive of much mischief, except they exist in very great quantities. Small doses of emetic tartar with a little ginger may be given to the horse half an hour before his first meal, in order to expel the round white worm; and injections of linseed-oil or aloes will usually remove the ascarides, or needle-worms.

The *respiratory passages* are all lined by the mucous membrane. *Catarrh*, or *cold*, inflammation of the upper air passages, should never be long neglected. A few mashes or a little medicine will usually remove it. If it is neglected, and occasionally in defiance of all treatment, it will degenerate into other diseases. The larynx may become the principal seat of inflammation. *Laryngitis* will be shown by extreme difficulty of breathing, accompanied by a strange roaring noise, and an evident enlargement and great tenderness of the larynx when felt externally. The windpipe must be opened in such case, and the best advice will be necessary. Sometimes the subdivisions of the trachea, before or when it first enters the lungs, will be the part affected, and we have *bronchitis*. This is characterized by a quick and hard breathing, and a peculiar wheezing sound, with the coughing up of mucus. Here, too, decisive measures must be adopted, and a skillful practitioner employed. His assistance is equally necessary in *distemper*, *influenza*, and *epidemic catarrh*, names indicating varieties of the same disease, and the product of atmospheric influence; differing to a certain degree in every season, but in all characterized by intense inflammation of the mucous surfaces, and rapid and utter prostration of strength, and in all demanding the abatement of that inflammation, and yet little expenditure of vital power.

Cough may degenerate into *inflammation of the lungs*; or this fearful malady may be developed without a single premonitory symptom, and prove fatal in twenty-four or even in twelve hours. It is mostly characterized by deathly coldness of the extremities, expansion of the nostril, redness of its lining membrane, singularly anxious countenance, constant gazing at the flank, and an unwillingness to move. A successful treatment of such a case can be founded only on the most prompt and fearless and decisive measures. The lancet should be freely used. Counter-irritants should follow as soon as the violence of the disease is in the slightest degree abated; sedatives must succeed to them, and fortunate will he be who often saves his patient after all the decisive symptoms of pneumonia are once developed.

Among the consequences of these severe affections of the lungs are *chronic cough*, not always much diminishing the usefulness of the horse, but strangely aggravated at times by any fresh accession of catarrh, and too often degenerating into *thick wind* which always materially interferes with the speed of the horse, and in a great proportion of cases terminates in broken wind. It is rare indeed that either of these diseases admits of cure. That obstruction in some part of the respiratory canal, which varies in almost every horse, and produces the peculiar sound termed *roaring*, is also rarely removed.

Glanders, the most destructive of all diseases to which the horse is exposed, is the consequence of breathing the atmosphere of foul and vitiated stables. It is the winding up of almost every other disease, and in every stage it is most contagious. Its most prominent symptoms are a small but constant discharge of sticky matter from the nose; an enlargement and induration of the glands beneath and within the lower jaw, on one or both sides, and, before the termination of the disease, chancrous inflammation of the nostril on the same side with the enlarged gland. Its contagiousness should never be forgotten, for if a glandered horse is once introduced into a stable, almost every inhabitant of that stable will, sooner or later, become infected and die.

The urinary and genital organs are also lined by mucous membranes. The horse is subject to *inflammation of the kidneys* from eating musty oats or mowburnt hay, or from exposure to cold and injuries of the loins. Bleeding, physic, and counter irritants over the region of the loins should be had recourse to. *Diabetes*, or *profuse staling*, is difficult to treat. The inflammation

that may exist should first be subdued; and then opium, catechu, and the uva ursi administered. *Inflammation of the bladder* will be best alleviated by mucilaginous drinks of almost any kind. *Inflammation of the neck of the bladder*, evinced by the frequent and painful discharge of small quantities of urine, will yield only to the abstraction of blood and the exhibition of opium. A catheter may be easily passed into the bladder of the mare, and the urine evacuated, but it will require a skillful veterinary surgeon to effect this in the horse. *A stone in the bladder* is readily detected by the practitioner, and may be extracted with comparative ease. The sheath of the penis is often diseased from the presence of corrosive mucous matter. This may easily be removed with warm soap and water.

To the mucous membranes belong the conjunctival tunic of the eye, and the diseases of the eye generally may be here considered. A *scabby itchiness* on the edge of the eyelid may be cured by a diluted nitrated ointment of mercury. *Warts* should be cut off with the scissors, and the roots touched with lunar caustic. *Inflammation of the haw* should be abated by the employment of cooling lotions, but that useful defence of the eye should never, if possible, be removed. Common *ophthalmia* will yield as readily to cooling applications as inflammation of the same organ in any other animal; but there is another species of inflammation, commencing in the same way as the first, and for a while apparently yielding to treatment, but which changes from eye to eye, and returns again and again, until blindness is produced in one or both organs of vision. The most frequent cause is hereditary predisposition. The reader cannot be too often reminded that the qualities of the sire, good or bad, descend, and scarcely changed, to his offspring. How *moon-blindness* was first produced no one knows; but its continuance in our stables is to be traced to this cause principally, or almost alone, and it pursues its course until cataract is produced, for which there is no remedy. *Gutta serena* (palsy of the optic nerve) is sometimes observed, and many have been deceived, for the eye retains its perfect transparency. Here, also, medical treatment is of no avail.

The serous membranes are of great importance. The brain and spinal marrow, with the origins of the nerves, are surrounded by them; so are the heart, the lungs, the intestinal canal, and the organs whose office it is to prepare the generative fluid.

Inflammation of the brain.—Mad staggers fall under this division. It is inflammation of the meninges, or envelops of the brain, produced by over-exertion, or by any of the causes of general fever, and it is characterized by the wildest delirium. Nothing but the most profuse blood letting, active purgation, and blistering the head, will afford the slightest hope of success. *Tetanus* or *locked jaw* is a constant spasm of all the voluntary muscles, and particularly those of the neck, the spine, and the head, arising from the injury of some nervous fibril—that injury spreading to the origin of the nerve—the brain becoming affected, and universal and unbroken spasmodic action being the result. Bleeding, physicing, blistering the course of the spine, and the administration of opium in enormous doses, will alone give any chance of cure. *Epilepsy* is not a frequent disease in the Horse, but it seldom admits of cure. It is also very apt to return at the most distant and uncertain intervals. *Palsy* is the suspension of nervous power. It is usually confined to the hinder limbs, and sometimes to one limb only. Bleeding, physicing, antimonial medicines, and blistering of the spine, are most likely to produce a cure, but they too often utterly fail of success. *Rabies*, or madness, is evidently a disease of the nervous system, and, once being developed, is altogether without remedy. The utter destruction of the bitten part with the lunar caustic, soon after the infliction of the wound, will, however, in a great majority of cases, prevent that development.

Pleurisy, or inflammation of the serous covering of the lungs and the lining of the cavity of the chest, is generally connected with inflammation of the substance of the lungs; but it occasionally exists independent of any state of those organs. The pulse is in this case hard and full, instead of being oppressed; the extremities are not so intensely cold as in pneumonia; the membrane of the nose is little reddened, and the sides are tender. It is of importance to distinguish accurately between the two, because in pleurisy more active purgation may be pursued, and the effect of counter irritants will be greater from their proximity to the seat of disease. Copious bleedings and sedatives here also should be had recourse to. It is in connection with pleurisy that a serous fluid is effused in the chest, the existence and extent of which may be ascertained by the practiced ear, and which in many cases may be safely evacuated.

The heart is surrounded by a serous membrane, the pericardium, that secretes a fluid, the interposition of which prevents any injurious friction or concussion in the constant action of this organ. If this fluid increases to a great degree, it constitutes *dropsy of the heart*, and the action of the heart may be impeded or destroyed. In an early stage it is difficult to detect, and in every stage difficult to cure.

The heart itself is often diseased; it sympathizes with the inflammatory affection of every organ, and, therefore, is itself occasionally inflamed. *Carditis*, or *inflammation of the heart*, is characterized by the strength of its pulsations, the tremor of which can be seen, and the sound can be heard at a distance of several yards. Speedy and copious blood letting will afford the only hope of cure in such a case.

The outer coat of the stomach and intestines is composed of a serous membrane, the peritoneum, which adds strength and firmness to their textures, attaches and supports and confines them in their respective places, and secretes a fluid that prevents all injurious friction between them. This coat is exceedingly subject to inflammation, which is somewhat gradual in its approach. The pulse is quickened, but small; the legs cold; the belly tender; there is constant pain, and every motion increases it; there is also rapid and great prostration of strength. These symptoms will sufficiently characterize *peritoneal inflammation*. Bleeding, aperient injections, and extensive counter irritation will afford the only hope of cure.

The time for *castration* varies according to the breed and destiny of the Horse. On the farmer's colt it may be effected when the animal is not more than four or five months old, and it is comparatively seldom that a fatal case then occurs. For other horses, much depends on their growth, and particularly on the development of their fore quarters. Little improvement

has been effected in the old mode of castrating, except the opening of the scrotum and the division of the cord by the knife, instead of the heated iron.

Synovial or *joint membranes* are interposed between the divisions of the bones, and frequently between the tendons, in order to secrete a certain fluid that shall facilitate motion and obviate friction. Occasionally the membrane is lacerated, and the synovia escapes. This is termed *opened joint*, and violent inflammation rapidly ensues. The duty of the practitioner is to close this opening as quickly as possible. Nothing is so effectual here as the application of the cautery. A great deal of inflammation and engorgement are produced around the opening, partially, if not altogether, closing it; or at least enabling the coagulated synovia to occupy and obliterate it. Perhaps, in order to secure the desired result, the whole of the joint should be blistered. After this a bandage should be firmly applied, and kept on as long as it is wanted. If there is any secondary eruption of the synovia, the cautery must again be had recourse to.

The Navicular Disease is a bruise, or inflammation, or perhaps destruction, of the cartilage of the navicular bone, where the flexor tendon of the foot passes over it in order to reach the coffin-bone. The veterinary surgeon can alone ascertain the existence and proper treatment of this disease. *Spavin* is an enlargement of the inner side of the hock. The splint-bones support the inferior layer of those of the hock, and as they sustain a very unequal degree of concussion and weight, the cartilaginous substance which unites them to the shank-bone takes on inflammation. It becomes bony instead of cartilaginous, and the disposition to this change being set up in the part, bony matter continues to be deposited, until a very considerable enlargement takes place, known by the name of *spavin*, and there is considerable lameness in the hock-joint. The bony tumor is blistered, and probably fired, but there is no diminution of the lameness until the parts have adapted themselves, after a considerable process of time, to the altered duty required of them, and then the lameness materially diminishes, and the horse becomes, to a very considerable extent, useful. *Curb* is an enlargement of the back of the hock, three or four inches below its point. It is a strain of the ligament which there binds the tendons down in their place. The patient should be subjected to almost absolute rest; a blister should be applied over the back of the tumor, and, occasionally, firing will be requisite to complete the cure. Near the fetlock, and where the tendons are exposed to injury from pressure or friction, little bags or sacks are placed, from which a lubricating mucous fluid constantly escapes. In the violent tasks which the Horse occasionally has to perform, these become bruised and inflamed, and enlarged and hardened, and are termed *windgalls*. They blemish the horse, but are no cause of lameness after the inflammation has subsided, unless they become very much enlarged. The cautery will then be the best cure. Immediately above the hock enlargements of a similar nature are sometimes found, and, as they project both inwardly and outwardly, they are termed *thorough-pins*. They are seldom a cause of lameness, but they indicate great and perhaps injurious exertion of the joint. On the inside of the hock a tumor of this kind, but of a more serious nature, is found. It is one of these enlarged mucous bags, but very deeply seated and the subcutaneous vein of the hock passing over it. The course of the blood through the vein is thus in some measure arrested, and a portion of the vessel becomes distended. This is a serious evil, since, from the deep-seatedness of the mucous bag, it is almost impossible to act effectually upon it. It is termed *bog* or *blood spavin*.

The cellular tissue which fills the interstices of the various organs, or enters into their texture, is the seat of many diseases. From the badness of the harness, or the brutality of the attendant, the poll of the horse becomes contused. Inflammation is set up, considerable swelling ensues. An ulcerative process soon commences, and chasms and sinuses of the most frightful extent begin to be formed. The withers also are occasionally bruised, and the same process takes place there, and sinuses penetrate deep beneath the shoulder, and the bones of the withers are frequently exposed. These abscesses are termed *poll evil* and *fistulous withers*, and in the treatment of them the Horse is often tortured to a dreadful extent. A better mode of management has, however, been introduced; setons are passed through the most dependent parts; no collection of sanious fluid is permitted to exist, and milder stimulants are applied to the surface of the ulcer.

An abscess of a peculiar character is found between the branches of the lower jaw in young horses. It is preceded by some degree of fever. It is usually slow in its progress, but at length it attains a considerable size, including the whole of the cellular tissue in that neighborhood. There is one uniform mass of tumefaction. This is *strangles*. It seems to be an effort of Nature to get rid of something that oppresses the constitution, and the treatment of it is now simple and effectual. It is encouraged by fomentations and blisters. It is punctured as soon as the fluctuation of a fluid within it can be fairly detected—the pus speedily escapes, and there is an end of the matter.

Farcy.—While the arterial capillaries are engaged in building up the frame, the absorbents are employed in removing that which is not only useless, but would be poisonous and destructive. They take up the matter of glanders and of every ulcerating surface, and they are occasionally irritated, inflamed and ulcerated from the acrimonious nature of the poison which they carry. The absorbents are furnished with numerous valves. The fluid is for a while arrested by them, and there the inflammation is greatest, and ulceration takes place. This is the history of the farcy cords and buds. Farcy is a highly contagious disease, whether or not it be connected with glanders. It, however, occasionally admits of cure from the application of the cautery to the buds, and the administration the corrosive sublimate or the sulphate of iron internally.

The skin of the Horse is subject to various diseases. Large pimples or lumps suddenly appear on it, and, after remaining a few days, the cuticle peels off, and a circular scaly spot is left. This is called *surfeit*. The cause is obscure, but principally referable to indigestion. A slight bleeding will always be serviceable. Physic rarely does good, but alteratives composed of nitre, black antimony, and sulphur, will be very beneficial. *Mange* is a disease of a different character. It is the curse of the stable into which it enters, for it will almost certainly affect every Horse. Thorough dressings with Barbadoes tar and linseed oil, in the proportion

of one of the former to three of the latter, will be the most effectual external application, while alteratives and physic should be given internally. *Hide-bound* is a very appropriate term for the peculiar sticking of the hide to the ribs when a horse is out of condition. The subcutaneous adipose matter is all absorbed. The alterative above recommended will be very useful here.

The legs, and the hind ones more than the fore ones, are subject to frequent and great and obstinate swellings, attended by great pain and considerable fever. It is acute inflammation of the cellular substance of the legs. Physic and diuretics, and tonics if there is the slightest appearance of debility, are the proper means of cure. Friction and bandages will also be useful occasionally. There is no disease in which the farrier and the groom do greater mischief than in this.

Grease is an undue secretion of the fluid which was designed to lubricate the skin of the heels, and that secretion is also altered in quality. The hind legs begin to swell—a fluid exudes from the heels—the hairs of the heels become erect like so many bristles, and the skin of the heel is hot and greasy. Soon afterward cracks appear across the heel; they discharge a thick and offensive matter, and then deepen. They spread up the leg, and so does the tumefaction of the part. In process of time the skin, inflamed and ulcerated, undergoes an alteration of structure; prominences or granulations appear on it, assuming the appearance of a collection of grapes, or the skin of a pine-apple. They increase, and a fetid discharge appears from the crevices between them.

The cause is generally neglect of the Horse. He is suffered to stand in the stable with his heels cold and wet, which necessarily disposes them to inflammation and disease.

In the first stage of grease, bran or turnip or carrot poultices will be serviceable, with moderate physic. Then astringents must be employed, and the best are alum or sulphate of copper in powder, mixed with several times the quantity of Bole Armenian, and sprinkled on the sores. These should be alternated every three or four days. The grapy heels are a disgrace to the stable in which they are found, and admit not of radical cure.

Splints are bony enlargements, generally on the inside of the leg, arising from undue pressure on the inner splint-bone, and this either caused by the natural conformation of the leg, or violent blows on it. These excrescences will often gradually disappear, or will yield to a simple operation, or to the application of the hydriodate of potash or blister ointments. *Sprains*, if neglected, occasionally become very serious evils. Rest, warm fomentations, poultices, or, in bad cases, blistering are the usual remedies. *Windgalls*, if they are of considerable size, or accompanied by much inflammation or lameness, will find in a blister the most effectual remedy. *Sprains of the fetlock* demand prompt and severe blistering. Nothing short of this will produce a permanent cure. *Sprains of the pastern and coffin-joints* demand still more prompt and decisive treatment. If neglected or inefficiently managed, the neighboring ligaments will be involved, more extensive inflammation will be set up, and bony matter, under the name of *ring-bone*, will spread over the pasterns and cartilages of the foot. Firing alone will, in the majority of cases, be efficient here.

Inflammation of the foot, or acute founder.—In speaking of the structure of the foot, the laminæ, or fleshy plates on the front and sides of the coffin-bone, were described. From overexertion, or undue exposure to cold or wet, or sudden change from cold to heat, inflammation of these laminæ is apt to occur, and a dreadfully painful disease it is. It is easily detected by the heat of the feet, and the torture which is produced by the slightest touch of the hammer. The shoe must be removed, the sole well pared out, plentiful bleeding from the toe had recourse to, the foot well poulticed, and cooling medicines resorted to. The bleeding should be repeated if manifest benefit is not procured, and cloths dipped in dissolved nitre, which are colder than the common poultice, should be substituted. After this a poultice around the foot and pastern should succeed. Little food should be given, and that must consist of green meat or mashes.

Pumiced Feet.—This is one of the consequences of inflamed feet. The sole of the foot becomes flattened, or even convex, by the pressure of the weight above. There is no cure here, and the only palliation of the evil is obtained from the application of a shoe so beveled off from the crust that it shall not press upon or touch the sole. This, however, is only a temporary palliation, for the sole will continue to project, and the horse will be useless.

Contracted Feet.—By this is meant an increase in the length of the foot, and a gradual narrowing as the heels are approached; and as the necessary consequence of this, a diminution of the width of the foot and a concavity of the sole. In point of fact, the whole of the foot, including the coffin-bone, becomes narrowed, and consequently elongated. This change of form is accompanied by considerable pain; the action of the Horse is altered; there is a shortened tread, and a hesitating way of putting the foot to the ground.

The frog and heel would expand when the weight of the Horse descends and is thrown upon them, but the nailing of the shoe at the heels prevents it. Thence the pain and lameness. Mr. Turner of Regent-street obviates this by a very simple method. He puts four or five nails in the shoe on the outside, and only two on the inside. There is then sufficient room for the natural expansion to take place, and the foot and action of the Horse are little or not at all changed. This is an admirable contrivance, and recourse should always be had to it.

The Navicular Joint Disease.—There are many Horses with open and well-formed feet that are lame. In every motion of the foot there is a great deal of action between the navicular bone and the flexor tendon which passes over it in order to be inserted into the navicular bone. From concussion or violent motion, the membrane or the cartilage which covers the navicular bone is bruised or abraded, the horse becomes lame, and often continues so for life. This disease admits of remedy to a very considerable extent; no one, however, but a skillful veterinary surgeon is capable of successfully undertaking it.

Sand-crack is a division of the crust of the hoof from the upper part of it downward. It bespeaks brittleness of the foot, and often arises from a single false step. If the crack has not penetrated through the horn, it must nevertheless be pared fairly out, and generally a coating of pitch should be bound round the foot. If the

crack has reached the quick, that *must* be done which ought to be done in every case—a skillful surgeon should be consulted, otherwise false quarter may ensue.

False Quarter is a division of *the ligament* by which the crust is secreted. It is one of the varieties of sand-crack, and exceedingly difficult to cure.

Tread or *Overreach* is a clumsy habit of setting one foot upon or bruising the other. It should immediately and carefully be attended to, or a bad case of *quittor* may ensue.

Quittor is the formation of little pipes between the crust and the hoof, by means of which the purulent matter secreted from some wound beneath the crust makes its escape. The healing of this, and of every species of *prick* or *wound* in the sole or crust, is often exceedingly difficult.

Corns are said to exist when the posterior part of the foot between the external crust and the bars is unnaturally contracted and becomes inflamed. Corns are the consequence of continued and unnatural pressure. The thorough cure of corns will put the ingenuity of the operator to the trial.

Thrush is the consequence of unnatural pressure on the frog. It is the cause and the effect of contraction, whether it is found in the heels of the fore feet or the hinder ones. It is not difficult to cure when taken in time, but when neglected it often becomes a very serious matter.

Canker is the consequence of thrush, or, indeed, of almost every disease of the foot. It is attended by a greater or less separation of horn, which sometimes leaves the whole of the sole bare. This, also, like the diseases of the foot generally, is difficult of cure.

Few things are more neglected, and yet of greater importance to the comfort and durability of the Horse, than a proper system of *shoeing*. It is necessary that the foot should be defended from the wear and tear of the roads, but that very defence too often entails on the animal a degree of injury and suffering scarcely credible. The shoe is fixed to the foot, and often interferes with and limits the beautiful expansibility of that organ, and thus causes much unnecessary concussion and mischief.

The shoe of a healthy foot should offer a perfectly flat surface to the ground. The bearing or weight of the Horse will then be diffused over the surface of the shoe, and there will be no injurious accumulation of it on different points. Too often, however, there is a convexity toward the inner edge, which causes an inequality of bearing, and breaks and destroys the crust. Round the outer edge of the shoe, and extended over two-thirds of it on the lower surface, a groove is sunk, through which pass the nails for the fastening of the shoe. At first they somewhat project, but they are soon worn down to the level of the shoe, which in the healthy foot should not vary from the heel to the toe.

The width of the shoe will depend on that of the foot. The general rule is that it should protect the sole from injury, and be as wide at the heel as the frog will permit.

The upper surface of the shoe should be differently formed. It should be flat along the upper end, outer supporting the crust, or, in other words, the weight of the horse, and widest at the heel, so as to meet and withstand the shock of the bars and the crust. The inner portion of the shoe should be beveled off, in order that, in the descent of the sole, that part of the foot may not be bruised. The owner of the Horse should occasionally be present when the shoes are removed, and he will be too often surprised to see how far the smith, almost wilfully, deviates from the right construction of this apparently simple apparatus. The beveled shoe is a little more troublesome to make and to apply than that which is often used by the village smith, but it will be the owner's fault if his directions are not implicitly obeyed.

Even at the commencement of the operation of shoeing, the eye of the master or the trustworthy groom will be requisite. The shoe is often torn from the foot in a most violent and cruel way. Scarcely half the clenches are raised when the smith seizes the shoe with his pincers and forcibly wrenches it off. The shrinking of the Horse will tell how much he suffers, and the fragments of the crust will also afford sufficient proofs of the mischief that has been done, especially when it is recollected that every nail-hole is enlarged by this brutal force, and the future safety of the shoe to a greater or less degree weakened, and pieces of the nail are sometimes left in the substance of the crust, which become the cause of future disease.

In the paring out of the foot, also, there is frequently great mischief done. The formidable *butteris* is still often found in the smithy of the country farrier, although it is banished from the practice of every respectable operator. A worse evil, however, remains. By the butteris much of the sole was injuriously removed, and the foot was occasionally weakened, but the *drawing-knife* frequently left a portion of sole sufficient to destroy the elasticity of the foot, and to lay the foundation for contraction, corns and permanent lameness. One object, then, of the looker-on is to ascertain the actual state of the foot. On the descent of the crust, when the foot is placed on the ground, depends the elasticity and healthy state of the foot, and that may be satisfactorily determined by the yielding of the sole, although to a very slight degree, when it is strongly pressed upon with the thumb. The sole being pared out, the crust on each side may be lowered, but never reduced to a level with the sole, otherwise this portion will be exposed to continual injury.

The heels often suffer considerably from the carelessness or ignorance of the smith. The weight of the Horse is not thrown equably on them, but considerably more on the inner than the outer quarter. The consequence of this is that the inner heel is worn down more than the outer, and the foundation is laid for tenderness and ulceration. The smith is too often inattentive to this, and pares away an equal quantity of horn from the inner and outer heel, leaving the former weaker and lower, and less able to support the weight thrown upon it.

Mention has already been made of the use of the *bars* in admitting and yet limiting to its proper extent the expansion of the foot. The smith in the majority of country forges, and in too many of those that disgrace the metropolis, seems to have waged interminable war with these portions of the foot, and avails himself of every opportunity to pare them down, or perfectly destroy them, forgetting, or never having learned, that the destruction of the bars necessarily leads to contraction by removing the chief impediment to it.

The horn between the crust and the bar should be well pared out. Every one accustomed to

Horses must have observed the great relief that is given to the Horse with corns when this angle is pared out, and yet from some fatality, the smith rarely leaves it where Nature placed it, but cuts away every portion of it.

The true function of the frog is easily understood. It gives security to the tread, and contributes expansion to the heels; but the smith, although these cases come before him every day, seems to be quite unaware of the course which he should pursue, and either leaves the frog almost untouched, and then it becomes bruised and injured, or he pares it away so that it cannot come into contact with the ground, and consequently is not enabled to do its duty.

The owner of the Horse will therefore find it his interest occasionally to visit the forge, and guided by the simple principles which have been stated, he will seldom err in his opinion of what is going forward there. He should impress two principles deeply on his mind, that a great deal more depends on the paring out of the foot than in the construction of the shoe: that few shoes, except they press upon the sole, or are made shamefully bad, will lame the Horse, but that he may be very easily lamed by an ignorant or improper paring out of the foot.

Where the owner of the Horse has sufficient influence with the smith, he will find it advisable always to have a few sets of shoes ready made. Much time will be saved, in case of accident, and there will not be, as is too often the case, the cutting and paring and injuring of the foot, in order to make it fit the shoe. More injury than would be readily believed is done to the foot by contriving to get on it too small a shoe.

INSECTS MOST INJURIOUS TO VEGETABLES AND ANIMALS,

AND THE MEANS BEST CALCULATED TO COUNTERACT THEIR RAVAGES

BY REV. JAMES DUNCAN, M. W. S.

[From the Journal of the Highland Agricultural Society of Scotland.]

LICE.—Almost all our domestic animals are well known to be more or less infested with minute parasites, which have been long referred by naturalists to the genus Pediculus. The great majority of our native animals, whether wild or in a domestic state, have their peculiar kinds appropriated to them. Indeed, it was long imagined that each and every animal had its own peculiar parasite, but this is not altogether borne out by facts; for,

"Although, in the majority of cases, a distinct species of insect is found upon each particular animal, i. e. quadruped or bird, yet there are several instances where the same kind infests three or four different species of birds, but, in such exceptions, they are almost always confined to individuals of the same genera or family, or at least to species of similar habits. This is more strictly the case with birds than quadrupeds. For instance, *Docophorus icteroides* I have found on nearly every species of duck which has come under my notice. I have received it from other birdo also; but they were of aquatic habits, and belonging to the order Natatores. The *Nirmus obscurus* infests several species of sandpipers, godwits, &c., the *Nirmus rufus* upon several of the hawks and falcons; and *Docophorus lari* upon nearly all the gulls. In the instances among quadrupeds it is rather doubtful whether the species is common to two different animals or not, or whether they may not have been merely transferred by associating or frequenting the same place of abode; as—for example, the *Trichodectes scalaris* found both upon the ox and ass—where the animals are feeding in the same stall, or sleep together, a transfer of property might easily be made. The *Hæmatopinus piliferus* infests dogs, and I have received specimens from the ferret, which last animal was said to swarm with them. Here it is rather difficult to account for the occurrence, as I am not aware that the two animals ever live on friendly terms with each other; and, moreover, the person from whom I received them informed me that he had not a dog. When we extend our observations to genera, we find they take a much wider range, and it is in only two or three cases that we could with any confidence assert that they were diagnostic of certain families of Vertebrata. It is easy to say whether they are belonging to quadruped or bird, but more difficult to pronounce the peculiar family of either, as some genera of each division appear perfect cosmopolites, as, for instance, the genus Pediculus of Linn., (since divided into Pediculus and Hæmatopinus,) besides infesting man, is also found in the orders *Quadrumana*, on monkeys; *Rodentia*, on the squirrel, hare, rabbit, water-rat; *Carnivora*, on the dog and seal; *Pachydermata*, on the swine, ass and camel; *Ruminantia*, on the deer, ox, and buffalo. The genus Nirmus, again, is very extensively spread, infesting every order of birds but the *Gallinaceæ*. Docophorus, all but *Gallinaceæ* and *Columbidæ*; Lipeurus infesting the orders *Gallinacea*, *Grallæ*, *Palmipedes*, and *Accipitres*; while, on the other hand, a few, as I have stated, are nearly certain indexes to the families. Eureum only on *Chelidones*; Trinoton only on *Palmipedes*; Goniocotes and Goniodes only on *Gallinacea* and *Columbidæ*; Gyropus only on the Guinea-pig in this country. Dr. Burmeister enumerates a species also from the Ai, (*Bradypus tridactylus*,) and, lastly, the genus Phthirius on man."*

Not only are there numerous instances of one kind of pedicular parasite being confined to one kind of animal, but in not a few cases there is a particular species assigned to different parts of the same animal, and these are seldom found to encroach on their respective provinces. This fact, in a physiological point of view, is exceedingly curious, and difficult to be accounted for. In Mr. Denny's beautiful work, a quotation from which has just been given, all the species hitherto found in this country are described and figured in a style of art which has been seldom surpassed as applied to entomological subjects. He enumerates nearly 250 different species as occurring on British animals. The great majority of these are found in too small numbers to produce any injury of importance; but others, again, as is well known to every one that rears and fattens cattle, multiply excessively at times, and are productive of great uneasiness and annoyance to the animals, while they greatly impair their look by denuding the skin of the hair, and giving it a very unsightly appearance.

Naturalists differ in opinion as to whether these insects undergo a true metamorphosis, like others of their class. The truth appears to be,

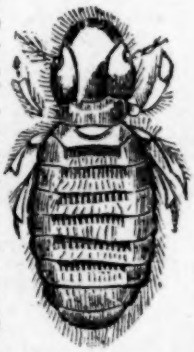
* "Denny's Monographia Anoplurorum Britanniæ," p. ix.

that the metamorphosis is very imperfect, and seems to consist in a series of consecutive changes of skin, and gradual increase in size, such as might be expected in an animal in its progress to maturity, rather than to form a metamorphosis, properly so called. In all stages they are active, and possess the power of taking food.

It is of importance, in a practical point of view, to be acquainted with the marks by which these troublesome and disagreeable parasites are distinguished, because different methods of destroying them require to be adopted according to their different habits and places of residence. The whole tribe is divided into two sections; the one containing such species as are provided with a tubular sucker, the other, the kinds having the mouth provided with two horny mandibles or jaws. These differences in the structure of the mouth must obviously exercise a great influence on their habits and general modes of procedure.

The first we shall notice, which is one of the most common and troublesome, belongs to the last-mentioned division; it is the *Trichodectes scalaris*. The genus Trichodectes is known by having the antennæ three-jointed; the tarsi with one claw; the head horizontal and scale-like, with the mouth beneath; mandibles strong, tridentate at the apex; the eyes very inconspicuous, and at all times invisible. All the species live upon quadrupeds, their food consisting of hair, wool, and exfoliated particles of the epidermis. Their jaws act horizontally, and cut off the hair close by the roots, exactly as if it had been done with a pair of scissors.

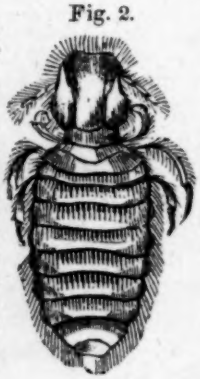
Fig. 1.



T. scalaris, Pediculus, bovis, Linn. LOUSE OF THE OX, is about half a line in length, the head and thorax of a bright rust-yellow, the former with two dusky spots in front, and of an abcordate shape; eyes prominent; antennæ pale yellow, the third joint longest and spindle-shaped; abdomen oblong, pale, tawny, finely pubescent, the first six segments with a transverse rust-red or dusky band on the upper half, and a large longitudinal spot of the same color on each side; the hinder extremity with a large similarly colored spot; legs pale; the claws nearly straight. (Fig. 1.)

This species is very common on cattle, and for the most part is found about the roots of the hair on the mane.

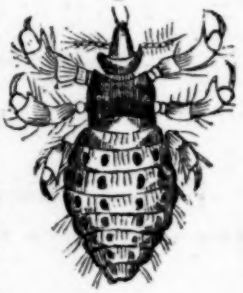
Fig. 2.



T. equi, Pediculus equi, Linn. LOUSE OF THE HORSE.—Nearly one-half larger than the preceding, but in other respects bearing a close resemblance to it. The head and thorax are of a bright chestnut color; the head somewhat square, with the angles rounded, and much wider than the thorax, having an angular dusky line on each side posteriorly; antennæ pale, thick, the last joint longest, and somewhat club shaped; abdomen obconical, colored nearly as in *T. scalaris*; legs pale, thick and strong, the tibiæ abruptly clavate; the tarsi short. (Fig. 2.)

Common on the horse and ass, multiplying to a great extent when these animals are afflicted with certain kinds of diseases. It is said to be most plentiful when the animals are fresh from pasture. Several other species belonging to this genus are found on different animals. One occurs on the sheep, (*T. sphærocephalus*,) another (*T. longicornis*) on the fallow-deer, and a third (*T. similis*) on the red-deer; but they never appear to increase on these animals to an injurious extent.

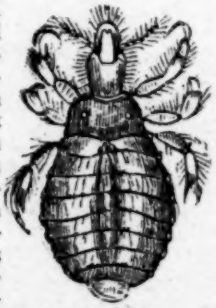
Fig. 3.



Hæmatopinus eurysternus. LOUSE OF THE OX.—In this genus the mouth is formed for sucking, there being a short tube projecting from the mouth; the antennæ are five-jointed; the thorax distinctly separated from the abdomen, and much narrower, shorter and broader than the head; abdomen large, depressed, commonly oval, consisting of eight or nine segments; legs formed for climbing, very thick and strong; claws single and incurved. Perhaps the most plentiful of all the species which infest cattle is that named above. The head, which is of a chestnut color, is somewhat triangular, rounded behind; the thorax dull chestnut, nearly square, with a spiracle and an impressed line on each side; abdomen greyish-white, or ochrey, smooth and shining, with four longitudinal rows of dusky, horny excrescences, the last segment with two black, curved marks; legs chestnut, the extremity of the claws black. Length from 1 to 1½ lines. (Fig. 3.)

It is this species, for the most part, that proves so troublesome to stalled oxen. It frequents chiefly the mane and shoulders. Being a suctorial insect, it cannot directly strip off the hair, but, by abstracting the juices by which the bulb or root of the hair is nourished, it makes it more liable to fall off, and the irritation its punctures occasion causes the animals to rub themselves till the skin is quite bare. Mr. Denny remarks that the young are much more agile than the mature insect, and differ in nothing except a want of proportion, the limbs being much thicker as compared with the bulk of the body than when adult. Another species, somewhat similar in appearance, (*H. vituli*,) occurs in the calf, but it does not appear to be common.

Fig. 4.



Hæmatopinus suis. Pediculus suis, Linn. LOUSE OF SWINE.—Head and thorax dusky rust-color, the former somewhat pear-shaped, with an angular black line at the apex, and one on each side before the eyes; hinder angles of the thorax acute, each side with a distinct spiracle; abdomen large, flat and oval; of a membranaceous consistency, bluish or yellowish ash color, sometimes nearly white; the second and five following segments with a black,

horny excrescence on each side surrounding the spiracles; the hinder segment with a black patch on each side; legs pale, long and thick. Length 1¼ to 1¾ lines. (Fig. 4.)

This species is found, for the most part, in great plenty on all kinds of swine, although certain breeds appear to be infested with more than others. Mr. Denny states that it does not appear to be so generally spread as might be expected from the dirty habits of the animals.

"It most frequently occurs (he says) on those fresh imported from the Sister Isle. It was many months before I could obtain a single example. I had applied to both farmers and pig butchers, neither of whom seemed to approve of the idea which I had conceived of *their* pigs being *lousy*, but referred me to those of the Emerald Isle as being sure to gratify my wishes—(forgetting, I suspect, that the Irish pigs come to this market to meet English buyers.) I accordingly visited a colony just arrived, when I certainly met with a ready supply; but here they were confined almost entirely to lean animals, and wherever I found a pig fat or healthy, no game were to be seen. In walking, this species uses the claw and tibial tooth with great facility (which act as finger and thumb) in taking hold of a single hair. The male is much smaller, with the abdomen shorter, suborbicular, and the segments lobate; the egg or nit is ¼ of a line in length, of a cream-color, and elegantly shagreened, oblong, and slightly acuminated, surrounded by a lid, which, when the young insect is ready to emerge, splits circularly, or, as a botanist would say, has a circumcisile dehiscence."

H. asini, Pediculus asini, Linn. LOUSE OF THE ASS.—About the size of the preceding species; color rust-yellow on the head and thorax, the former very long, narrow anteriorly, with two black patches on each side near the apex; abdomen large and ovate, pale-yellowish white, wrinkled and hairy, with a dusky, horny excrescence surrounding each spiracle; the last segment with a large angular black spot on each side; legs short and thick, the color of the thorax. Length 1 to 1¾ lines.

This parasite is very plentiful on the ass, particularly about the head and mane, but, probably, owing to the thick skin of the animal, it does not appear to occasion it much annoyance. The rabbit is also infested with a peculiar species of *Hæmatopinus*, and likewise the dog, but they seldom increase to any great extent.

These are the principal pedicular parasites which are most annoying to our most useful quadrupeds. Birds of almost every kind, whether wild or tame, have also their peculiar inhabitants of this class; not a few of them are infested by several different kinds. This is the case more especially with the common domestic fowl, which has at least five species appropriated to it. Of these, one of the most common, which may be seen running over the hands of those employed in plucking fowls, and which is difficult to brush off, owing to the flatness and smoothness of its body, is the

Menopon pallidum, Pediculus gallinæ, Linn. It is very minute, not exceeding ¼ or ⅓ of a line in length; the color pale straw, the surface shining and smooth; head triangular and obtuse, with pitchy spots on each side; antennæ with the fourth joint large and oblong, and terminating in a tuft of hairs; eyes dark; abdomen elongate oval, the segments equal; legs rather thick, the anterior thighs broad and round. The other species which infest poultry are the *Goniodes dissimilis*, a genus remarkable for having, in the males, the third joint of the antennæ recurved toward the first, and forming a claw, by which the insect can lay hold of a hair, the barb of a feather, or any other small object; *Goniocotes hologaster*, having the head, thorax and legs pale yellow, with pitchy black marginal bands and spots, and the abdomen with pale ash-colored lateral bands bordered with black. Neither of these two species is common. But the *Lipeurus variabilis*, which may be known by being of a dull white color margined with black, is very abundant on the domestic fowl, preferring the primary and secondary feathers of the wings, among the webs of which it moves with great celerity.

Two or three different species inhabit the various kinds of pigeon. Of these the most common is *Goniocotes compar*, which has a large ahed, with produced acute angles behind, from each of which two long bristles project; abdomen white, broad and obovate, the margin all round rusty brown; length from 1 to 1¼ line. Next to this in frequency, and sometimes still more abundant, is *Lipeurus baculus*, the body of which is very narrow and elongated, the head angular and depressed; the abdomen nearly cylindrical, dull yellow-white, with a series of large trapezoidal dusky patches on each side. Few birds, Mr. Denny remarks, are so infested with parasites as the *Columbidæ*; besides four species of lice, he has found upon them a large *Ixodes*, a small *Acarus*, and the *Pulex columbæ*; and Rev. S. Jenyns detected a bug, *Cimex columbarius*, which he has described in the "Annals of Natural History."*

Grouse, and their near ally, the common partridge, are far from being exempted from these unwelcome visitors; and in unhealthy seasons, when the former are in a debilitated state, the attacks of the parasites tend greatly to retard or prevent their recovery. *Goniodes tetraonis* infests both the black-cock and common grouse, and is, for the most part, very common. The form of the head resembles that of *Goniocotes compar*; color of the head and thorax pale chestnut yellow; abdomen pale yellowish-white, obovate, lateral margin bright chestnut, each segment, except the antepenultimate, with a pitchy sutural, somewhat club-shaped, abbreviated band. Length about a line; the female somewhat larger. *Nirmus cameratus* is also common on the red grouse. It is much smaller than the above, deep chesnut color and pilose; head short, and somewhat heart-shaped; central band and sutures of the abdomen pale yellow white. The species most frequently observed on the common partridge is *Menopon perdricis*, a very minute insect, not exceeding ⅓ of a line in length, of a dull ochrey yellow, the head large and almost semilunar, with a dusky spot on each side, and a band before each eye; the abdomen broad. A more remarkable looking species, also frequenting this bird, is named *Goniodes dispar*, but it is not of frequent occurrence. One of the largest known parasites of this class occurs on the peacock. It is *Goniodes falcicornis, Pediculus pavonis*, Linn. The female is about 2 lines in length; and the male has the first joint of the antennæ with a large tooth on the internal edge; second cylindrical; the apex oblique; third long and recurved; fourth and fifth very small, in the female filiform. This insect may be found alter the death of the bird collected in numbers about the base of the beak and crown of the head. *Goniodes stylifer*, which has a considerable general resemblance to the above, is found on the turkey; it is easily recognized

* Vol. V. p. 242.

by having the hinder angles of the head produced into a sharp projection like a horn.

Many other of our domestic birds, such as geese, ducks, &c., have each a peculiar parasite of this class assigned to them, and there are scarcely any of our wild birds that are without similar assailants. But in such cases, the parasites appear to do little or no injury, and it is unnecessary, therefore, to refer to them more particularly.

In regard to the means best adapted for counteracting the ravages of these parasites, lice on cattle and horses may be destroyed by a plentiful and repeated application of oil, and also by repeated rubbing of mercurial ointment into the affected parts of the skin; but, on using this latter substance, care should be taken not to expose the animal to rain or cold.

INDIAN CORN—USE OF IT IN ENGLAND.

"One who knows" wrote us before the opening of the British Parliament:—"You will see the duty reduced or taken off grain of all kinds. As to Indian Corn, it will take 20 years to introduce it into England. It is within my memory that potatoes have been brought into general use, and oat-meal within twenty years. They would as soon have taken ratsbane forty years ago, as have used oat-meal or drank buttermilk; as they called it eating horse-corn bread and drinking *pigs' punch*."

Every thing must have a beginning, and, comparatively speaking, 20 years is as little time for change in the habits of a whole nation, as one year for an individual.

The best way to accelerate the change would be to station some old colored women cooks from the South—some of those who are going off to Liberia—in the hotels of Ireland, that land of green fields and rich butter, and in the kitchens of the opulent and fashionable, and the lower order would soon learn to overcome the prejudice springing from the impression that Indian Corn meal is eaten only by "pigs and negroes," as was said when Mr. Escott moved to take off the duty.

If Planters were cemented together and habituated to act under the influence of that *esprit du corps* which influences other classes each for its particular benefit, they would be taking measures to establish some agency in England which would facilitate the introduction and use of corn meal. No well-provided breakfast or dinner table is without it, in some most palatable form, in our Southern States, where people know what good living is, and usually *eat the best* and sell only *what they can't eat*.

PRICES CURRENT.

[*Corrected, March* 18, *for the Monthly Journal of Agriculture.*]

ASHES—Pots, 1st sort	℔ 100 lb.	4 —	@ 4 06¼
Pearls, 1st sort, '45		4 37½	@— —
BEESWAX—American Yellow		— 29½	@— 30
CANDLES—Mould, Tallow	℔ lb.	— 9	@— 11
Sperm, Eastern and City		— 26	@— 38
COTTON—From	℔ lb.	— 6¼	@— 10½
COTTON BAGGING—American		— 12	@— 13
CORDAGE—American	℔ lb.	— 11	@— 12
DOMESTIC GOODS—Shirtings	℔ y.	— 5½	@— 11
Sheetings		— 7	@— 15
FEATHERS—American, live		— 26	@— 32½
FLAX—American		— 7½	@— 7¾
FLOUR & MEAL—Genesee	℔ bbl.	5 50	@ 5 56½
Troy		— —	@— —
Michigan		5 50	@— —
Ohio, flat hoop		5 50	@— —
Ohio, Heywood & Venice		6 25	@ 6 37½
Ohio, via New-Orleans		5 12½	@ 5 37½
Pennsylvania		— —	@— —
Brandywine		5 50	@ 5 62½
Georgetown		5 12½	@ 5 25
Baltimore City Mills		5 —	@ 5 12½
Richmond City Mills		6 50	@— —
Richmond Country		5 25	@ 5 37½
Alexandria, Petersburg, &c.		5 —	@— —
Rye Flour		3 87½	@ 4 —
Corn Meal, Jersey and Brand.		3 37½	@ 3 50
Corn Meal, Brandywine	hhd.	16 —	@— —
GRAIN—Wheat, Western	℔ bush.	1 15	@ 1 25
Wheat, Southern	new	1 10	@ 1 15
Rye, Northern		— 80	@— 85
Corn, Jersey and North	(meas.)	— 68	@— 70
Corn, Southern	(measure)	— 68	@— —
Corn, Southern	(weight)	— 67	@— 68
Oats, Northern		— 44	@— 45
Oats, Southern		— —	@— —
HAY—North River	bales	— 80	@— 85
HEMP—American, dew-rotted	ton	85 —	@100 —
" " water-rotted		125 —	@175 —
HOPS—1st sort, 1845		— 20	@— 30
IRON—American Pig, No. 1		35 —	@37 —
" Common		25 —	@30 —
LIME—Thomaston	℔ bbl.	1 05	@— —
LUMBER—Boards, N.R.,	℔M. ft. clr.	35 —	@40 —
Boards, Eastern Pine		11 —	@13 —
Boards, Albany Pine	℔pce.	— 10	@— 19
Plank, Georgia Pine	℔M. ft.	32 50	@35 —
Staves, White Oak, pipe	℔ M.	50 —	@— —
Staves, White Oak, hhd		40 —	@— —
Staves, White Oak, bbl		31 —	@— —
Staves, Red Oak, hhd		27 —	@30 —
Hoops		25 —	@30 —
Scantling, Pine, Eastern		— —	@16 25
Scantling, Oak		30 —	@35 —
Timber, Oak	℔ cubic foot	— 25	@— 37
Timber, White Pine		— 18	@— 25
Timber, Georgia Yellow Pine		— 20	@— 25
Shingles, 18 in	℔ bunch	1 75	@ 2 —
Shingles, Cedar, 3 feet, 1st quality		— —	@24 —
Shingles, Cedar, 3 feet, 2d quality		22 —	@23 —
Shingles, Cedar, 2 feet, 1st quality		19 —	@— —
Shingles, Cedar, 2 feet, 2d quality		16 —	@18 —
Shingles, Cypress, 2 feet		13 —	@14 —
Shingles, Company		— —	@29 —
MUSTARD—American		— 16	@— 31
NAILS—Wrought, 6d to 20d	℔ lb.	— 10	@— 12½
Cut 4d to 40d		— 4	@— 4½
PLASTER PARIS	℔ ton	2 62½	@— —
PROVISIONS—Beef, Mess,	℔ bbl.	8 —	@ 8 25
Beef, Prime,		5 25	@ 5 50
Pork, Mess, Ohio		10 75	@11 25
Pork, Prime, Ohio		9 —	@ 9 37½
Lard, Ohio	℔ lb.	— 6½	@— 7½
Hams, Pickled		— 6	@— 6½
Shoulders, Pickled		— 4	@— 4½
Sides, Pickled		— 6½	@— —
Beef, Smoked	℔ lb.	— 6½	@— —
Butter, Orange County		— 14	@— 18
Butter, Western Dairy		— 12	@— 14
Butter, ordinary		— 10	@— 12½
Cheese, in casks and boxes		— 7	@— 8
SEEDS—Clover	℔ lb.	— 8½	@— 10½
Timothy	℔ tierce	13 —	@17 —
Flax, Rough		9 —	@— —
SOAP—N. York, Brown	℔ lb.	— 4	@— 6
TALLOW—American, Rendered		— 7	@— 7½
TOBACCO—Virginia	@ lb.	— 3	@— 6
North Carolina		— 3	@— 5
Kentucky and Missouri		— 3	@— 7
WOOL—Am. Saxony, Fleece,	℔ lb.	— 38	@— 40
American Full Blood Merino		— 36	@— 38
American ½ and ¾ Merino		— 30	@— 33
American Native and ¼ Merino		— 26	@— 28
Superfine, Pulled		— 28	@— 30